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BULLETIN OF THE RESEARCH COUNCIL OF ISRAEL

Section B BIOLOGY and GEOLOGY

Bull. Res. Counc. of Israel. B. Biol. & Geol.

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BULLETIN OF THE RESEARCH COUNCIL OF ISRAEL

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CONTENTS

THE INFLUENCE OF DESICCATED THYROID AND THYMUS AND OF THREE INORGANIC SALTS ON THE RATE OF DEVELOPMENT OF *DROSOPHILA*

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The effects of feeding desiccated thyroid gland tissue on the rate of development of insects were investigated on several occasions (for review see Hanstrom 1939), but the results and conclusions were disappointingly contradictory and inconsistent. According to Resnicenko (1927) and Dobkiewich (1928), thyroid feeding did not influence the duration of larval development in *Drosophila*. On the other hand, Alpatov (1929) observed a significant increase in the body length of larvae in thyroid-fed *Drosophila* cultures, which he interpreted as indicating a growth-accelerating effect of the thyroid material. In his extensive study on *Tribolium confusum* Schneider (1940) found that feeding desiccated thyroid resulted in "an acceleration in normal metamorphosis"; he concluded that the influence of thyroid material on insect metabolism was essentially comparable with its effects on vertebrate metabolism, being similarly due to the action of the characteristic hormonal product of the gland.

In connection with related physiological studies, we became interested in this problem and consequently an attempt was made to reexamine the specificity of the positive results referred to above. In the present study, highly inbred strains of *D. melanogaster* were used, with rates of development uniformly constant under standard breeding conditions. Fluctuations of the rate of development were determined by comparing duration (in hours) of the developmental cycle (egg to imago) of flies in the experimental breedings with that of normal controls. Measurements of body length of full grown experimental and control larvae were taken and compared. The methods of breeding followed in general those described by Alpatov (1929).

The first series of experiments consisted of cultures on a standard food medium, with powdered, desiccated sheep thyroid added in fifteen different concentrations ranging from 0.1% to 12% of the total amount of the food mixture. In the first generation bred on the thyroid medium no significant acceleration of development was observed. The highest concentrations had a retarding influence, undoubtedly due to toxic effects, and were not used in later series. In cultures on 1%—8.5% concentrations, there was an increase in the mean body length of full grown larvae, as compared with controls; the adults were of normal size. Later evidence strongly suggested that this increase in larval body length was due to nutritional conditions, possibly to the high protein content of the thyroid food mixture.

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In contrast with the first generation, the second thyroid-fed generation showed a significant acceleration of development. This took place on 1%—4.5% thyroid concentrations and was due to a shortened larval period. The rate of acceleration progressed still further in the third thyroid-fed generation (on the same concentrations), whereupon the effect evidently reached its limit, as no further decrease in the duration of development was noted in the subsequent 25 generations on any of the thyroid concentrations tested.

TABLE I

Changes in duration of development (egg to imago) of successive thyroid-fed generations of Drosophila (Concentr. of desiccated thyroid material in food 2.5%; breeding temp. 27°C)

Generation		Duration of develop. in hours	Mean dur. of develop. in hours ($M \pm 3m$)	$m_{Diff.}$
Control on normal food		187—193	189.84 ± 1.07	
				C:F_1— 1.2
	F_1	185—194	189.24 ± 1.14	
				F_1:F_2—29.3
	F_2	176—183	179.72 ± 0.92	
Thyroid-fed				F_2:F_3—28.0
generations	F_3	165—172	168.08 ± 0.86	
				F_3:F_4— 1.8
	F_4	167—174	169.01 ± 0.13	
				F_4:F_{25}— 3.6
	F_{25}	168—176	171.80 ± 2.42	

From these results it was tentatively concluded that desiccated thyroid tissue, when fed in "effective" concentrations, exerted an accelerating influence on the rate of development of *Drosophila*, and that this was brought about mainly through a cumulative decrease in duration of the larval period in generations F_2 to F_4.

The nature of this acceleration effect and its specificity in relation to the action of the thyroid material, were next studied. Experiments were arranged in which the food mixture was supplemented with one of the following substances: desiccated thymus tissue (two different commercial preparations were used), $NaNO_3$, $CuSO_4$, KCl. Additional series of thyroid-fed cultures, using a different thyroid preparation, were also carried out. As in the first experiments, various concentrations of the materials tested were tried out (Table II).

TABLE II

Concentrations of materials tested

Substance	Range of concentr. tested (%)	Range of "effective" concentr. (%)
Thyroid (I)	0.1 — 12	1 — 4.5
Thyroid (II)	0.5 — 9.5	0.8 — 4
Thymus (I)	0.1 — 12	1.5 — 5
Thymus (II)	0.5 — 10	1 — 5.5
$NaNO_3$	0.1 — 10	2 — 4
$CuSO_4$	0.05 — 0.5	0.065 — 0.075
KCl	0.1 — 5	0.3 — 0.9

The results of these series are summarized in Table III. It is evident that they parallel essentially those of the thyroid series: for each of the substances fed, an "effective" concentration could be determined, the effect of which resulted in the characteristic, progressive acceleration of development during generations F_2 to F_4. In the thymus series, as in the thyroid series, there was an increase in the larval body length in F_1; this, probably nutritional, effect was not observed in the salt series.

TABLE III

*Changes in duration of development (egg to imago) of successive generations of Drosophila bred on media containing desiccated thymus and inorganic salts**
(Breeding temp. 27°C)

Generation		Duration of develop. in hours	Mean duration of develop. in hours	$m_{Diff.}$
Control on normal food mixture		187—193	189.84 ± 1.07	
	F_1	183—195	187.90 ± 3.92	C :F_1 — 1.4
with	F_4	169—177	172.60 ± 2.59	F_1:F_4 — 9.7
thymus	F_{25}	167—173	170.40 ± 2.22	F_4:F_{25}— 1.9
	F_1	186—193	189.60 ± 1.89	C :F_1 — 0.3
with	F_4	167—175	169.90 ± 2.36	F_1:F_4 —19.5
$NaNO_3$	F_{25}	169—175	171.20 ± 1.91	F_4:F_{25}— 1.2
	F_1	184—194	189.42 ± 2.43	C :F_1 — 0.5
with	F_4	166—173	168.90 ± 2.04	F_1:F_4 —19.5
$CuSO_4$	F_{25}	166—174	169.89 ± 3.53	F_4:F_{25}— 0.7
	F_1	185—193	189.20 ± 2.80	C :F_1 — 0.6
with	F_4	164—170	167.10 ± 2.09	F_1:F_4 —19.1
KCl	F_{20}	167—172	169.43 ± 1.96	F_4:F_{20}— 2.5

* Concentr. in food of desiccated thymus tissue — 3.5%; $NaNO_3$ — 3%; $CuSO_4$ — 0.07%; KCl — 0.5%.

The fundamental similarity between the acceleration effects obtainable both with desiccated thyroid and thymus and the inorganic salts suggests the following considerations. The accelerating action of thyroid material on the development of *Drosophila* cannot be regarded as specific or as due to the characteristic principle of this gland; other, entirely different substances, when present in suitable concentrations in

the food, caused a similar effect. This conclusion fits well with certain observations by Zavrél (1931), who found that larval development of *Chironomus* was accelerated equally by feeding either thyroid or thymus. It is, of course, quite impossible to state whether all of the substances tested acted to their final, similar effect through identical physiological mechanisms. One should consider, at least on theoretical grounds, the possibility that, in spite of their apparent similarity, the final effects might have been due to quite dissimilar primary metabolic changes. When this study was completed a number of years ago, it was intended to pursue the problem further with suitable tracer techniques. However, proper facilities for such studies have not yet materialized here and the results are therefore published in their present tentative form in the hope that they may be of use elsewhere.

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THE CERAMBYCIDAE OF ISRAEL

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ABSTRACT

A revised and annotated faunal list is given of 84 species of Cerambycidae occurring in Israel. The occurrence of 8 species of these is likely but not sufficiently documentated. 5 species are endemic for the region. A faunal spectrum gives the following composition:

Mediterranean and endemic elements	78.2%
Euro-Siberian and Holarctic elements	10.2
Irano-Turanian element	6.1
Saharo-Sindian element	1.4
Ethiopian element	4.1

It should be noted, however, that no purely West Mediterranean, Euro-Siberian and Irano-Turanian elements penetrate into the region; all species mentioned as such have a wider distribution also in the Mediterranean region.

New description: *Notophysis rugosiceps* Pic ♂.

New synonymy: *Rhesus serricollis* Motsch. (= *R. caesariensis* Pic); *Coptosia nigrosuturata* Heyr. b. spec. (= *C. ganglbaueri* Pic ab. *nigrosuturata* Heyr.)

The present paper is an attempt to give an up to date revised and annotated list of the Longicorn beetles of Israel. Bodenheimer (1937) has published a list of 71 species, based on records from earlier literature together with records from his own catches, determined by the entomologists of the British Museum. Heyrovsky (1948) has pointed out, however, that a number of the species mentioned are of very doubtful occurrence and are very probably misidentifications. I could confirm this opinion by redetermining several of these specimens kept in the collections of the Division of Plant Protection and of the Agricultural Experimental Station, Rehovot. During the last 15 years 24 species have been added to Bodenheimer's list, and these are indicated by an asterisk.

The author wishes to express his deepest gratitude to Dr. Leo Heyrovsky, Prague, who not only examined and determined a number of doubtful specimens but also facilitated our work by sending us several species for comparison.

Contributions to the study of the Cerambycid fauna of Israel have been made by the following authors: Reiche (1855-58), Sahlberg (1902-03, 1913), Bodenheimer (1934, 1937). Furthermore, Reiche, Ganglbauer, Sahlberg, Pic and others have published new species and forms. Since the appearance of Bodenheimer's list (1937), Heyrovsky (1948, 1950, 1954) published 3 smaller papers, the first based on the collections made by himself in 1930 and by my late friend J. Houska during 1940-46, and the two following based on material sent to him for determination by the author. A

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number of species, the occurrence of which could not be verified, are quoted by Plavilstshikov (1931-34, 1938-40) as occurring in "Palestine", but it seems that the material sent to him for examination was not reliably labelled. Some of these species are known to inhabit the higher altitudes of the Lebanon and Syria.

Altogether 84 species of Cerambycidae are recognized as occurring in Israel (without taking into account the above mentioned probable misidentifications); out of these 8 species seem to have somewhat doubtful references, and have not been found by me, though their occurrence is likely.

A detailed faunal analysis is given in Table I, and a simplified analysis, excluding the doubtful and introduced species, in Table II.

TABLE I

Faunal analysis of all species

Species	CM	EM	ES CM	ES EM	E CM	E EM	CM IT	EM IT	ES CM IT	ES EM IT	SS	Eth.	End.	Introd.	Total
Recognized	9	32	2	2	7	3	4	4	1	1	1	3	5	4	76
Doubtful	—	5	1	—	1	1	—	—	—	—	—	—	—	—	8
Total	9	36	3	2	8	4	4	4	1	1	1	3	5	4	84
%	10.9	42.8	3.7	1.2	9.2	4.7	4.7	4.7	1.2	1.2	1.2	3.6	6.2	4.7	100

TABLE II

Simplified faunal analysis of the recognized species (without the introduced species)

Species	CM	EM	IT	ES	E	SS	Eth.	End.	Total
Points*	15.4	35.5	4.5	2.6	5	1	3	5	73
%	20.8	50.6	6.1	3.4	6.8	1.4	4.1	6.8	100

* Each species is allotted 1 point if it occurs in one region, ½ point and ⅓ of a point for each region for occurrence in 2 or 3 regions, respectively.

A summary shows the following distribution of faunal elements:

	Med.+End.	IT	ES	SS	Eth.
This paper	78.2	6.1	10.2	1.4	4.1 %
Bodenheimer (1935): 55 species	74.5	12.7	10.8 (+Hol.)	1.8	— %

As can be seen, the analysis agrees rather well with that given by Bodenheimer (1935). The percentage of the Irano-Turanian element, however, is much lower, many of those species in Bodenheimer's list being misidentified. The Ethiopian element was still unknown to this author.

The faunal analysis (Table I) shows that more than half of all the species are purely Mediterranean, and 43% strictly East Mediterranean. Purely European, Euro-Siberian, West Mediterranean and Irano-Turanian species are missing. In the final summary,

however, the European-Euro-Siberian faunal element is represented by 10.2%, and the Irano-Turanian by 6.1%. This may be explained by the fact that species of this type recorded from Israel have a wider geographical distribution, which extends into the Mediterranean or Irano-Turanian regions (ES/Med,Med/IT, etc.).

Most of the European forest inhabiting genera, as *Ergates*, *Aegosoma*, *Harpium*. *Rhagium*, *Pachyla*, *Evodynus*, *Gaurotes*, *Necydalis*, *Caenoptera*, *Obrium*, *Spondylis*, *Tetropium*, *Xylotrechus*, *Monochamus*, *Acanthocinus*, *Saperda*, etc., do not penetrate southward into Israel, although most of them are still found in Asia Minor. The Irano-Turanian species mentioned are in reality tree inhabiting species of wider geographical distribution of Euro-Siberian or Mediterranean origin. They penetrate from the north with their food plants along the rivers, or they occur in the more temperate climate of mountain forests. The true steppe genera, as *Prionus*, s.g. *Lobarthron*, *Polylobarthron*, *Pogonarthon*, *Pseudoprionus*, and genera as *Dissopachys*, *Apatophysis*, *Osphranteria*, *Cleroclytus*, among others, do not exist in this country, though some of them penetrate into eastern Asia Minor. Even *Dorcadion* and *Neodorcadion*, characteristic species of the steppes and dry mountain meadows of the whole Palaearctic region (but with their centre of origin in the Irano-Turanian region), are represented in Israel by one doubtful species of *Dorcadion* only.

There are few penetrations from the south (5.6%), but these are of special zoogeographical interest. They include one of the rare true Saharian species, *Prionus* (*Polylobarthron*) *unipectinatus*, living in the date palm, and three Ethiopian species: *Notophysis rugosiceps* and *Crossotus arabicus*, both living in desert acacias, and *Apomecyna arabica*.

The five endemic species of Israel occur in the Mediterranean part of this country and in the final faunal analysis are included with the Mediterranean species.

Many genera of Cerambycidae inhabiting herbaceous plants (*Agapanthia*, *Pilemia*, *Oxylia*, *Phytoecia*) may be found in spring or early summer on their food plants. Some wood inhabiting genera (e.g. *Stenopterus*, *Callimellum*, *Leptura*, *Purpuricenus*, *Clytus*, *Chlorophorus*, etc.) visit flowers, chiefly Umbellifers, *Althaea* and *Echinops*. Most of the other species which do not visit flowers are attracted by light, and only a few must be looked for at night on their food trees. In this connection, the opinion expressed by Bodenheimer (1934) that all Cerambycidae have diurnal habits should be corrected. A cursory glance at the following faunal list shows that many species are nocturnal, and in fact one third (24 out of 71) of the species have nocturnal habits even if they are too heavy to enter light traps, or are not attracted by light at all.

ABBREVIATIONS

CM	— Circummediterranean	IT	— Irano-Turanian
E	— European	Med.	— Mediterranean
EM	— East Mediterranean	S	— Saharian
End.	— Endemic	SS	— Saharo-Sindian
ES	— Euro-Siberian	WM	— West Mediterranean
Eth.	— Ethiopian	Bod.	— Bodenheimer
FE	— Faunal element	Heyr.	— Heyrovsky
Hol.	— Holarctic	Plav.	— Plavilstshikov
Introd.	— Introduced	Sahlb.	— Sahlberg

PRIONINAE

Macrotoma scutellaris Germ. Plav. 1936, Bod. 1937

Rehovot 8.VIII; Lydda 4.X, ex railway sleeper (coll. Div. Plant Prot.); Miqve Israel 28.XI, in *Eucalyptus* trunk; Jaffa V, larva in dry *Citrus* wood; Yarqon river (Tel Aviv) 11.IV, bred from dead *Citrus* trunk; Kfar Saba 7.IX, from *Casuarina* wood; Hebron 5.X, from "Abraham's Oak" (*Quercus calliprinos*); Hadera VI; Pardess Hanna 15.V — 14.VII; 'Atlit 20.VII; Carmel (Haifa) 7.VII; Qiryat Motzkin, in *Morus;* Acre 28.VI; Magra 3.VII, from *Citrus* wood; Elon 24.VII; Daphne Oaks VII; bred from dead branch of *Quercus ithaburensis* 13.VIII — 20.X; Dan 8.VI.

Extremely polyphagous, but not observed hitherto in coniferous wood.

Distribution: S. Europe, N. Africa excl. Egypt, Israel, Syria, Asia Minor to W. Iran, Crimea. FE: CM/IT.

Rhesus serricollis Motsch. (syn. *Rh. caesariensis* Pic). Figure 3. Bod. 1937

Caesarea (type locality of *Rh. caesariensis* Pic); Daphne Oaks 20.X, on *Quercus ithaburensis*, the largest ♂ measuring 62.5 mm; Dan 1. — 28.VIII, 8.VII.

Specimens from Daphne and Dan are identical with specimens of *Rh. serricollis* from Syria, and the original description of Pic (1918) does not mention any characteristic feature of this species which cannot be attributed also to *Rh. serricornis;* I am therefore treating here *Rh. caesariensis* Pic as synonymous to *Rh. serricornis* Motsch.

Distribution: Europe from Dalmatia eastwards through Turkey, Asia Minor to Iran; Syria, Israel. FE: EM/IT.

**Notophysis rugosiceps* Pic. Figure 1.

One mutilated ♂ found on the foot of a desert *Acacia* at 'Ein Hatseva 12.X, leg. L. Fishelson. Body length 81 mm; length of the mandibula 15 mm. The specimen resembles perfectly the description and figure given by Pic (1924), but its mandibles are more developed because it is a ♂. Holotype: the ♀ from Abou Simbel, Upper Egypt, in coll. Pic. Neoallotype: the above mentioned ♂.

Distribution: Upper Egypt, Israel (Negev). FE: Eth.

Prionus besikanus Fairm. (nec *boskianus* Fairm. Bod. 1934) Bod. 1934, 1937

Jerusalem 14.IV—10.VIII; Hebron 27.VI; Tel Aviv 8.V; Hadera 3.VI; Pardess Hanna 22.V; Giv'at 'Ada 23.VIII; Tiv'on VI; Kfar Blum.

Distribution: Greece, Turkey, Asia Minor, Israel. FE: EM.

Prionus lefebvrei Mars. Bod. 1937, Heyr. 1948

Jerusalem 25 — 27.VI; Tel Aviv 5 — 13.VI; Miqve Israel 19.IV; Pardess Hanna 23.V; Karkur 4.IV; Carmel VI; Daphne Oaks VII — VIII.

The larva of probably this species is damaging the roots and root collars of apple trees in groves planted in the vicinity of maquis vegetation (Qiryat 'Anavim, Beit Oren).

Distribution: Israel, Syria, the Lebanon. FE: EM.

Prionus asiaticus Fald. Bod. 1937

According to Heyrovsky 1948: misidentification.
Distribution: S. Russia to Transcaucasia. FE: IT.

Prionus angustatus Jakowl. Bod. 1937

According to Heyrovsky 1948: misidentification. All specimens in the coll. Plant. Prot. determined as *angustatus* Jakowl. belong to *besikanus*.
Distribution: Transcaspia, Lake Aral, Ferghana. FE: IT.

**Prionus unipectinatus* White (syn. *afrum* Bdi; *baudii* Pic). Figure 2.

One ♂ Revivim 11.XI, caught on lamp. Its host plant: date palm growing in the vicinity.

Distribution: Egypt, Israel. FE: S.

CERAMBYCINAE

**Criocephalus tristis* Fab. 1787 (syn. *ferus* Muls.; *polonicus* Motsch.)

According to H. Lipp (1937), this species must bear the Fabrician name.

Carmel 15.VIII — 6.IX; Qiryat 'Amal 7.XI; Mishmar Ha'emeq 5.X; Geva' 6.VII; Ginegar (coll. Beit Gordon); Beit Hashita, hatched 30.VII from a radio case imported from Italy (imported specimen?).

Distribution: Algiers, Europe through Transcaucasia to Siberia; Syria, Israel. FE: ES/CM.

**Criocephalus syriacus* Rttr. Figure 5. Heyr. 1950

Carmel 11.VI — 1.XI, raised from *Pinus halepensis;* Ahuza (Carmel) 7.VIII, on pine stump.

Distribution: S. France, Italy, Israel, the Lebanon, Syria. FE: CM.

**Icosium tomentosum* Luc. ab. (ssp.?) *atticum* Gglb.

ab. *atticum* Gglb. 1881: elytrae with dark shoulder stripe, suture blackish. All specimens from Israel have black sutures, but shoulder stripes are present in some specimens only. I am nevertheless classifying our specimens as belonging to this eastern variety.

Tel Aviv 10.V — 22.VIII, ex *Cupressus* wood; Rishon le Zion V — VII; Carmel VI, ex *Cupressus* wood. This species is extremely common in dying or dead *Cupressus* wood.

Distribution: *I. tomentosum* — Circummediterranean, ab. *atticum* — Greece, Israel. FE: EM.

**Cerambyx velutinus* Brllé var. *centurio* Czwal. Figure 6.

Our largest *Cerambyx*, specimens reaching up to 65 mm body length.

Pardess Hanna 16.IV — 15.VI, on *Quercus ithaburensis;* Khreibe Oaks (Carmel) VI, on *Q. coccifera*; Dan 1.VII.

Large exit holes of this species were found also at Daphne Oaks, in very large trees 200 to 600 years old only.

Distribution: Israel, Syria. FE: EM.

Cerambyx cerdo L. ssp. *acuminatus* Motsch. Bod. 1937

Zakariya (Hebron) 2.VI; Alonim 20.VI; Tiv'on 15.VII; Beit Haqeshet 23.VI; Dan 5.V—29.VI. Specimens from the Carmel range also seen. This species seems to prefer smaller trees and its larva bores in oaks in all the above localities.

Distribution: From S.E. Russia eastwards to Armenia, Asia Minor, Syria, Israel. FE: EM.

Cerambyx cerdo L. ssp. *mirbecki* Luc. Bod. 1937

Heyrovsky 1948: misidentification. This purely West Mediterranean race definitely does not occur here.

Cerambyx dux Fald. Bod. 1937, Heyr. 1948

Jerusalem 10.II — 15.XI, on almonds, apricots, plums; Hebron 27.VII; vicinity of Hebron III—IV, on quinces, coll. Groman; Qiryat 'Anavim 17.VI; Artas 18.VI; Haifa 25.V—26.VII; Faradiye 31.V, on plums; Lavia 1.VI, on almonds; Jami el Ahmar (Safed) 30.V — 7.VI; Bassa 1.VI, on almonds; Rosh Pina 21.V.46; Dan 18.VI. Very common in the hill and mountain regions, noxious to fruit trees of the genus *Prunus;* recently reported also from the plains: Ramle, Miqve Israel. Most of the specimens mentioned above are kept in the collection Div. Plant Prot.

The bionomics of this species in Israel have been studied by P. Jolles (1932).

Distribution: Italy (Apennines), Eastern Mediterranean, Asia Minor, Caucasus, Syria, Lebanon, Israel. FE: EM.

Jebusaea hammerschmidti Rche et Saulcy Bod. 1937

Since its original description in 1877 (Type locality: Jaffa) this species has not been found again. The author, who has been living in Jaffa for 5 years, has looked for it in vain. Recently mentioned by Roubal (1932) from Baghdad.

Distribution: Israel, Iraq. FE: EM/IT?.

Hesperophanes sericeus F. Bod. 1937

Tel Aviv 10.X; Mishmar Ha'emeq 1.V, ex apple twig; no locality, hatched VII, ex apple; Carmel VI; Elon VI.

Distribution: Morocco, Northern Mediterranean, Crimea, Caucasus, Egypt, Israel. FE: CM.

Trichoferus griseus F. Bod. 1937

Jerusalem 21 — 26.VI; Wadi el Kelt 18.VII; Miqve Israel 17.VI; Binyamina VI, ex *Ceratonia siliqua;* Ilanot VII, bred from fig wood; Tira VI — VII, from fig tree; Carmel (Haifa) 7.VI, from fig wood; Kadoorie School (Tabor) V — VI, bred from fig branch; Birwa VII, bred from fig tree; Metulla 16.VII, from fig tree. Extremely common in dry fig wood.

Distribution: the whole Mediterranean from the Canaries to Egypt, Israel, Syria, Asia Minor, Transcaucasia to Iran. FE: CM/IT.

Trichoferus cinereus Vill. (syn. *gayi* Winkl. Cat. Col.; Bod. 1937; nec *gayi* Plavilstshikov 1917, 1932)

Most of the specimens identified as *T. cinereus* Vill. are *griseus* F., but there is one specimen in the coll. Div. Plant Prot., Jerusalem Archaeological Museum 8.VIII.38, which was probably brought over with imported timber from Europe.

Distribution: S. Europe, N. Africa, Asia Minor to Transcaucasia, Iran. FE: CM/IT/Introd.

Stromatium fulvum Vill. Bod. 1937

Jerusalem 29.VII — 24.IX; Tel Aviv 13.VI — 2.X; Jaffa 1.VII — 14.IX, from dry *Citrus* wood; Binyamina 15.VI; Haifa VI—VIII, from *Morus* and *Cercis* branches; road to Qiryat Shmone 12.V — 15.VI, from dry branch of *Pistacia atlantica*. Extremely common in houses, infesting furniture, doors and window frames (pine wood). The abundance of dry trees in abandoned *Citrus* groves has given an excellent opportunity for mass development of this pest in recent years.

Distribution: Along the whole Mediterranean coast, through Turkey, Persia to Turkestan. Introduced into N. America and Cuba. FE: CM.

Penichroa fasciata Steph. Bod. 1937, Heyr. 1948

Rehovot 6.VI, from dead twig of *Morus;* Tel Aviv 11.V; Miqve Israel 26.VI, from branch of dying *Poinciana regia;* Pardess Hanna 11.V; Carmel (Haifa) 24.IV, from *Cercis siliquastrum*.

Distribution: S. Europe, N. Africa, along the whole Mediterranean, through Syria to Iran and Transcaucasia. FE: CM/IT.

Rhamnusium graecum Schauf. Bod. 1937

I have not seen this species from Israel, although its occurrence seems likely.
Distribution: Greece, Syria, Asia Minor, Transcaucasia. FE: EM.

Cortodera kochi Pic (L'Echange, **51,** 4, 1935: Palestine) Bod. 1937

Distribution: Israel. FE: EM (End.)

?*Cortodera discolor* Fairm. Bod. 1937

This quotation may refer to the endemic species mentioned above.
Distribution: Eastern Mediterranean, Asia Minor. FE: EM.

**Phoracantha semipunctata* Fab. Figure 4.

Extremely common from Dan to Beersheba, and also at 'Ein Hatseva, wherever *Eucalyptus* trees are found. An important tree and timber pest. Adults are found the whole year round.

The bionomics of this species have been studied by Bytinski-Salz and Neumark (1952) and Bytinski-Salz (1952).

Distribution: Australia (endemic), New Zealand, S. Africa, Argentina, Chile, Brazil, Israel (introduced). FE: Introd. (during the early 1940's).

?*Leptura unipunctata* F. Plav. 1936

This species is recorded here on the authority of Plavilstshikov, who includes " Palestine " in the list of its distribution. Its occurrence is likely.

Distribution: C. and S. Europe, N. Africa, Israel, Syria, Asia Minor to Siberia, south to Lake Aral. FE: ES/CM.

Leptura ustulata Mén. Bod. 1937

This record probably refers to the following species.

**Leptura rufa* Brllé

Pardess Hanna 7.IV, 1 specimen only (det. Heyrovsky).

Distribution: Italy, S. Balkans, Israel, Syria, Asia Minor, N. Iran to Transcaucasia. FE: E/EM.

Leptura cordigera Fuessl. Bod. 1937

Hadera 17.V; Pardess Hanna 6.V; Haifa 31.V; Yagur (Qishon river) 7.VI; Hanita 14.V; Dan 11.VI. Oaks are to be found in all these localities.

Distribution: S. Europe, Asia Minor, the Lebanon, Israel. FE: CM.

?*Strangalia septempunctata* F. Plav. 1936

This species is recorded by Plavilstshikov, who mentions "Palestine" in the list of its distribution. Two other species of the same genus are recorded by Heyrovsky (1937) from the Lebanon.

Distribution: C. and S. Europe, Asia Minor to Transcaucasia. Syria, Israel. FE: E/EM.

**Stenopterus flavicornis* Küst.

Jerusalem 25.VI; Qiryat 'Anavim IV; Ma'ale Hahamisha 28.V; Alonim V, bred from *Quercus ithaburensis*; Daphne Oaks 27.V.

Distribution: S. Europe, Syria, the Lebanon, Israel. FE: CM.

**Stenopterus rufus* L. ssp. *syriacus* Pic. Heyr. 1948

Yarqon river 3.V; Binyamina 7.V — 2.VI; Khreibe Oaks (Carmel) 21.IV — 16.VI; Jebel Jermak (900 m) 12.V.

Distribution: Syria, Israel. FE: EM.

Stenopterus ater L. Bod. 1937

According to Heyrovsky 1948: misidentification. A specimen in the coll. Div. Plant Prot. determined as *St. ater* L. proved to be *St. rufus* L. ssp. *syriacus* Pic.

Distribution: C. and S. Europe to Crimea, N. Africa. Not to be found from east of Tunis to Asia Minor. FE: E/WM.

**Callimellum adonis* Ab. Plav. 1932

Haifa (Plav.); Carmel (Haifa) 7.V.

Distribution: S. Europe, Asia Minor, Syria, Israel. FE: EM.

Cartallum ebulinum L. ab. (ssp.) *ruficolle* F.

Sahlb. 1902—03, 1913, Bod. 1934, 1937 (all as *ebulinum* L.); Heyr. 1948 (as *ruficolle*)

Jericho, Wadi el Kelt, 1.I — 4.III; Jerusalem 16.III — 18.IV; Miqve Israel III — IV; Ramat Gan 30.IV; Holon 28.III; Rehovot 3.III; Binyamina 23 — 25.III; Alonim 27.III; Tiberias 27.III — 16.V; El Hamme 18.IV; Beisan 31.III; also found in Northern Negev and Western and Upper Galilee. Very common in spring on flowers, especially Cruciferae.

All the specimens seen by the author belong to the ab. *ruficolle* F., which should therefore be raised, at least in Israel, to the rank of a subspecies.

Distribution: S. Europe, Circummediterranean to Asia Minor, Iran and Transcaucasia. FE: CM.

Deilus fugax Oliv. Bod. 1937

Binyamina 17.IV; Carmel 8.IV; Khreibe Oaks (Carmel) 6.V.

Distribution: C. and S. Europe, N. Africa east to Tunis, Russia east to the Urals, Asia Minor, the Lebanon, Israel. FE: E/CM.

Aromia moschata L. ssp. *thoracica* Fisch. Figure 9. Bod. 1937 (as var. *ambrosiaca* Stev.)

Hulata 2.VII, on *Salix;* Daphne Oaks 17.VI; Banyas river above Dan 3.VI, on *Salix;* Dan 15.V — 8.VI; Mansura 26.V.

All specimens seen by the author belong to the f. *thoracica* Fisch. (thorax red with darker front and hind edges, but without dark longitudinal stripe), which seems therefore to represent a valid geographical variety in Israel.

Distribution of ssp. *thoracica* Fisch.: Algiers, S. Russia, Caucasus, Lenkoran, Asia Minor, Syria, the Lebanon, Israel. FE: EM (penetr. WM?)/IT.

Rosalia alpina L. ssp. *syriana* Pic. Plav. 1934: Jerusalem

This species also is recorded by Plavilstshikov. A very strange locality for a species preponderantly living in dense beech (*Fagus*) forests.

Distribution: Syria, Asia Minor. FE: EM.

Rhopalopus lederi Gglb. Plav. 1934, Bod. 1937

Both records mention "Palestine", without locality.

Distribution: Crimea to Transcaucasia, N. Iran, Syria, Israel. FE: EM.

Phymatodes testaceus L. Bod. 1937, Heyr. 1948

ab. *fulvipilis* Müll.: Jerusalem 27.V (Heyr.);
ab. *subtestaceus* Plav. 1934: Carmel 6.IV, coll. Div. Plant Prot.

Distribution: Europe to N. Iran and Transcaucasia, Asia Minor, Syria, Israel, N. Africa, N. America (introduced). FE: E/IT.

Hylotrupes bajulus L. Bod. 1937

f. typ.: Jerusalem 18.V, from pine wood; Carmel (Haifa) 18.V; Ramle 28.V, from wooden door.

ab. *syriacus* Théry: Jerusalem 7.VII; Tel Aviv X; Binyamina 7.VI; Carmel VI; 'Afula, Kfar Yeladim 12.VI.

ab. *scutifer* Voet.: Jerusalem 16.VII, from railway sleeper (imported); Tel Aviv 13.VI; Carmel (Haifa) 13.V, from pine board.

I have found this species only in the vicinity of human habitations, and there is no evidence that it has established itself in the open. The species must probably be regarded as being continually introduced, but able to breed locally for some time. It certainly must not be considered a pest as in other subtropical countries, for instance South Africa.

Distribution: Through the whole Euro-Siberian and Mediterranean region. N. America, S. Africa (introduced). FE: ES/CM (Introd.?)

Clytus rhamni Germ. Bod. 1937, Heyr. 1948

Alonim 10.V — 13.VI.
ab. *temesiensis* Germ.: Alonim 17.V (Heyr.)

Distribution: C. and S. Europe, Asia Minor, N. Iran, Transcaucasia, the Lebanon, Israel. FE: E/CM.

Clytus bytinskii* Heyr. (Entom. Arb. Mus. Frey, **5, 1954). Figure 10.

Rehovot V, from dead apple branch (Types and paratypes); Hulda 10.IV, from dead branch of *Acacia cyanophylla.*

Distribution: Israel. FE: Endem. (EM).

Plagionotus speciosus Adams. (syn. *bobelayi* Brllé) Bod. 1934, 1937

Jerusalem 30.IV; Qiryat 'Anavim VI; Yarqon river 31.V; Hadera 10.V; Haifa 23.IV; Alonim 26.IV; Ramat Yohanan 11.V; Upper Galilee 10.V; Ayelet Hashahar 16.V; Manara 22.V — 2.VI.

Distribution: Balkans, Greece, Asia Minor, the Lebanon, Israel, Caucasus to Transcaucasia. FE: EM/IT.

Plagionotus floralis ssp. *floralis* Pall. Bod. 1937

Ma'ale Hahamisha 28.V; Na'an 21.V; Binyamina 7.V; Migdal 19.V; Tiberias 2.V; Deganya 7.VI; Hula 24.V.

Distribution: C. and S. Europe to Transcaucasia and Siberia, Asia Minor, Syria, Israel. FE: ES/CM.

Chlorophorus varius Müll. ssp. *damascenus* Chevr. Bod. 1934, 1937, Heyr. 1948, 1950

The following forms are found in almost all local populations: f. typ. Chevr. — rare; ab. *ocellatus* Vit. — rare; ab. *kanabei* Heyr. — common; ab. *paulojunctus* Pic — not rare.

Jericho and Wadi el Kelt 26.IV — 23.V; Jerusalem 7.VI; Ma'ale Hahamisha 2.VII; Ramle 2.VI; Miqve Israel V; Tel Aviv (dunes) V; Rehovot V — VI, bred from apple twig; Ruhama 27.VI; Binyamina 29.V — 2.VI; Yagur 7.VI; Ramat Yohanan 2.VII, bred from vine stem; Acre 28.V; Rosh Haniqra 9.VII; Tiberias 2.VI; Deganya 30.IV; Migdal 24.VI; Qiryat Shmone 7.VII; Metulla 27.VII.

The larva is often found in apple branches and vine stems, but it has not yet been established whether it attacks healthy wood.

Distribution: Egypt, Israel, the Lebanon, Syria. FE: EM.

**Chlorophorus trifasciatus* F. Heyr. 1948

Qiryat 'Anavim 18.VI — 27.VI; Ma'ale Hahamisha 28.V — 28.VI; Alonim 10.V.

Distribution: S. Europe, N. Africa, Egypt, Israel. FE: CM.

Chlorophorus sartor Müll. Bod. 1934, 1937, Heyr. 1948

Among the type form also rarely ab. *progressivus* Plav.

Qiryat 'Anavim V — 18.VI; Ma'ale Hahamisha 28.V; Miqve Israel V — VI; Yarqon river; Rehovot 17.IV; Beeri 1.VI; Binyamina 2.IV — 2.VI; Hadera 21 — 26.V; Carmel (Haifa) 23.IV — 27.VI; Yagur (Qishon river) 7.VI; Alonim 10.V; Sa'ar 7.V; Tiberias 10 — 16.V.

Distribution: C. and S. Europe to Siberia, Asia Minor, the Lebanon, Israel. FE: ES/EM.

**Chlorophorus nivipictus* Kraatz

Sasa 17.VI, bred from dead branch of *Quercus ithaburensis*.

Distribution: Syria, Israel. FE: EM.

Chlorophorus madoni Pic. Figure 11. Sahlb. 1913 (spec. ign. aff. *madoni* Pic), Bod. 1937

Qishon valley 31.III (Sahlb.); Nahalal 17.IV.

Distribution: Israel, Cyprus. FE: EM.

Purpuricenus dalmatinus Sturm ssp. *hirsutus* Plav. 1940 Bod. 1930, 1937

Besides the type form, ab. *humeropunctus* Plav. 1940 has also been found.

Carmel (Haifa) IV; Elon 11.IV, on flowering *Quercus infectoria;* Nahalal, forest bred from branch of *Q. calliprinos* (Bod. 1930).

Distribution of ssp. *hirsutus* Plav.: Asia Minor, Syria, Israel. FE: EM.

Purpuricenus desfontainesi F. ab. (ssp.?) *inhumeralis* Pic. Figure 8.

Bod. 1937 (as "*desfontainei*", also quoted in this form in Winkler's Cat. Coleopt., but the name is derived from the French entomologist René Luiche Desfontaines, 1755—1833)

Jerusalem VII; Binyamina 30.V; Dalia 4.IV — 13.V; Elon 13.V — VII.

Almost all specimens belong to the ab. *inhumeralis* Pic, which therefore must be considered as the local subspecies. Only 1 ♀ (Elon 12.V, leg. Fishelson) with completely black pronotum represents the ab. *corvinicollis* Plav. Figure 8 below.

Distribution: N. Africa, S. Greece, Syria. Israel. FE: CM.

Purpuricenus budensis Götze Bod. 1937, Heyr. 1948

Of the 8 specimens seen by the author, 4 belong to the m. *budensis* Plav. and 4 to the m. *interscapilatus* Plav. 1940. It is therefore probable that a population with gradations between the two morphae occurs in Israel.

m. *budensis* Plav.: Pardess Hanna IV; Elon IV.
m. *interscapilatus* Plav.: Beit Haqeshet (Tabor) 28.VI, on *Quercus ithaburensis*; Banyas river, above Dan, 3.VII; Manara 22.VI.

Distribution: m. *budensis* — C. and S. Europe, N. Africa, Caucasus, Asia Minor (?), Israel; m. *interscapilatus* — Asia Minor, Syria, Israel. FE (*budensis*): CM.

LAMIINAE

? *Dorcadion forcipiferum* Kraatz Bod. 1937

Bodenheimer's (1937) listing of this species seems to be based on two records:

(1) The citation in Winkler's Cat. Coleopt. :"Pal.", which goes back to the original description of Kraatz 1873 (Käfer Europas XXIX, Heft 60: "von Dr. Roth in Palästina aufgefunden"). Ganglbauer (1884, p. 67) treats *D. forcipiferum* as a variety of the common Anatolian *D. septemlineatum* Waltl. Prof. H. v. Sachtleben, Director of the Deutsche Entomologische Institut, Berlin — Friedrichshagen, to whom I am indebted for many literary references, was so kind as to trace this species in the collection of the Institute where the coll. Kraatz is kept, and he writes to me: "There is only one specimen, the type, from Palestine, bearing the label 'Palästina Roth'. The other specimens present are from Asia Minor and Anatolia". Johannes Roth, who visited all parts of Palestine and also Sinai, Transjordan and the Hermon in three journeys between 1836 and 1858, collected during these expeditions also in Greece and Asia Minor. Without examining the type it is at the moment impossible to say how far this specimen is really a valid species, or whether it belongs to one of the Greek, Turkish or Anatolian races of *D. septemlineatum* Waltl.

(2) Two specimens of a *Dorcadion* form, one of them bearing a determination label '*D. forcipiferum* Kr. det. G. E. Bryant', and the strange label: 'Huleh on Nuphar VII. leg. Shulov'. This is evidently a case of mislabelling for a genus characteristic of the steppes and dry mountain meadows, where it occurs in late winter — spring, the more so as a Carabid, *Callisthenus eversmanni* Chaud., living in the same habitat, also bears the same locality label. A redetermination of one of the specimens carried out by Dr. L. Heyrovsky proved it to be *D. subvestitum* Dan., a rather common species of Asia Minor. There is, therefore, in my opinion, no conclusive evidence for the occurrence of *Dorcadion* in Israel, though it certainly ought to be expected in the dry mountain meadows of Upper Galilee, as at least two species, though not belonging to the *D. septemlineatum* group, *D. libanoticum* Kr. and *D. drusum* Chevr., occur in the neighbourhood.

It is unknown to me on what evidence Bodenheimer (1937) includes *Dorcadion*? *caucasicum* Küst. in the faunal list of Israel, but in any case it must be a misidentification.

**Batocera rufomaculata* De Geer. Figure 7.

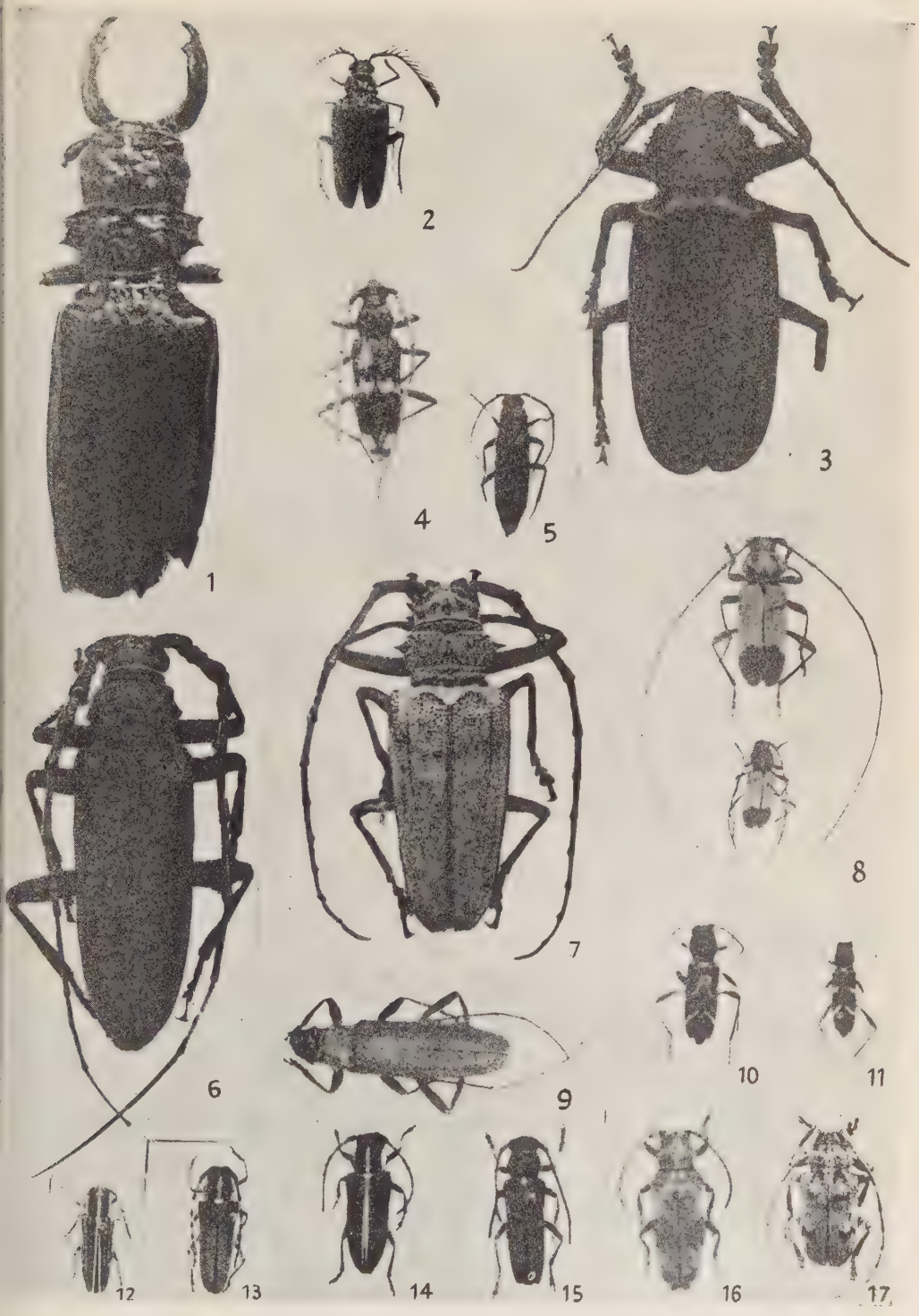
This species was introduced into Israel during the late 1940's. Since then it has spread considerably and occupies at present (summer 1956) the following regions: coastal plain from Tel Aviv to Rosh Haniqra, the entire Carmel range east to Megiddo, 'Emeq Yizre'el and Lower Galilee north of Nazareth. The adults appear at the beginning of June and can be found till November. The larva is extremely noxious to fig trees: it can kill a fig tree within 1 — 3 years. The bionomics of this species in Israel have been studied by Bytinski-Salz (1952-53).

Distribution: India, Indomalaya, Mauritius, E. Africa; West Indies, Israel, (introd.). FE: Introd.

**Crossotus arabicus* Gah. Figure 17.

'Ein Hatseva VI — VII, from dead wood of *Acacia spirocarpa* and *A. raddiana;* Wadi Fukra VIII, from *A. raddiana* (ByS. and Neumark). This species has recently killed 3 — 4 year old *A. cyanophylla* trees in the Municipal Garden of Eilat (e.l. VII — VIII.1954).

Distribution: Arabia, Israel ('Araba). FE: Eth.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Niphona picticornis Muls. Bod. 1937

Rehovot 24.VI; Qubeibe (near Rehovot) 17.XII; Tel Aviv 15.V; Hadera 17.VII; Pardess Hanna 10.VI; Carmel 15.III; Kfar Ata 7.VI; Kfar Masaryk VI, on green vine; Nahariya 4.VII; Gvat II, from fig wood.

Distribution: along the whole Mediterranean to Syria. FE: CM.

**Apomecyna arabica* Breun. Figure 16.

Urim, Revivim 12.VI, collected at light.

Distribution: Arabia, Somaliland, Israel (Negev). FE: Eth.

Anaesthesis testacea F. Bod. 1937

Distribution: C. and S. Europe, Israel, Lebanon, Syria, Asia Minor. FE: E/EM.

Calamobius filum Rossi Bod. 1934, 1937, Heyr. 1948

Jerusalem 9.IV — 26.V; Qiryat 'Anavim V; Carmel 22.IV; Khreibe Oaks (Carmel) 6 — 16.IV; Sha'ar Ha'amaqim 2.III; Elon 8.V.

Distribution: C. and S. Europe, N. Africa, Israel, the Lebanon, Asia Minor. FE: E/CM.

Agapanthia irrorata F. Bod. 1937

According to Heyrovsky 1948: misidentification.
Distribution: purely West Mediterranean.

Agapanthia kirbyi Gyll. Sahlb. 1913, Bod. 1937

Binyamina 12 — 22.IV, on *Verbascum;* Carmel 1.IV, on *Verbascum;* Tiberias 17.III; Daphne 14.IV.

Distribution: C., E. and S. Europe to Transcaucasia, Asia Minor, Syria, Israel. FE: E/CM/IT.

?*Agapanthia asphodeli* Latr. Plav. 1930, Bod. 1937

The validity of this record rests on Plavilstshikov l.c.: Palestine. All the specimens in the coll. Div. Plant Prot. previously determined as *A. asphodeli* have proved to be either *A. dahli* or *A. lateralis*. The author has not met with this species, though its occurrence is very likely.

Distribution: C. and S. Europe, N. Africa, Asia Minor to Transcaucasia, Syria, the Lebanon, Israel. FE: E/CM.

Agapanthia lateralis Gglb. var. *pustulifera* Pic Sahlb. 1913, Bod. 1937

Qishon valley 31.III; Kfar Kanna (Canae) 28 — 29.III (Sahlb.); Tiberias 26.IV; Mishmar Hayarden 29.IV (coll. Div. Plant Prot.).

Sahlberg lists this species as *lateralis* Gglb., while the specimens in coll. Div. Plant Prot. belong to var. *pustulifera* Pic.

Distribution: from Dalmatia east to Asia Minor, Syria, Israel, Egypt; var. *pustulifera* Pic from Israel only. FE; EM.

Agapanthia dahli Richt. Sahlb. 1913, Bod. 1937, Heyr. 1948

Extremely common on thistles. Jerusalem 2 — 28.IV; Kfar 'Ivri 5.V; Wadi Fara'; Rishon le Zion 25.IV; Lakhish 13.IV, on *Asphodelus;* Beersheba 14.III; Wadi Fukra 5.IV; Carmel 7.IV — 2.V; Khreibe Oaks (Carmel) 20.IV; Binyamina 12 — 13.IV; Shilo 18.III; Hanita 17.IV, on *Asphodelus;* Sasa 7.V; Tiberias 12.III — 14.IV; Deganya 8.III; Rosh Pina 15.IV; Daphne 31.III.

Distribution: Europe to Siberia, Mediterranean (excl. N. Africa), Asia Minor, Iran, Turkestan, Syria, the Lebanon, Israel, Egypt. FE: ES/CM/IT.

Agapanthia mullneri Rttr. Plav. 1930, Bod. 1937

The validity of this record rests on Plavilstshikov's quoting the locality as "Palestine (Trappen 1908)". The occurrence of this purely Central Asiatic species in Israel seems very doubtful, and till further specimens are available it is better excluded from this list. It may be a misidentification of *A. simplicicornis* Rttr., which occurs in the Lebanon.

Distribution: Turkestan, Margelan, Alexander Mts. FE: IT.

?*Agapanthia simplicicornis* Rttr. Bod. 1937

The author has not seen any specimen on which Bodenheimer's record is based, but the occurrence of this species in Israel seems likely, as it is mentioned by Heyrovsky (1937) from the Lebanon.

Distribution: Asia Minor, the Lebanon. FE: EM.

Agapanthia cynarae Germ. 1817 Bod. 1937

(According to Plavilstshikov the synonymy with the earlier decribed *A. boeberi* Fisch, 1806 is very doubtful).

According to Heyrovsky 1948: misidentification. All specimens in the coll. Div. Plant Prot. determined as *cynarae* Germ. are *dahli* Richt.

Distribution: C. Europe through S. Russia to Caucasus, S.W. Europe east to Dalmatia. FE: E/WM.

Agapanthia cardui L. Sahlb. 1913, Bod. 1934, 1937, Heyr. 1948, 1950

The type form, and also the var. *consobrina* Chevr. occur among the local populations. The specimens mentioned by Sahlberg (Haifa 31.III) and Bodenheimer (Qiryat 'Anavim V, on *Anthemis*) are quoted simply as *cardui* L. The material of Heyrovsky and of the author can be divided as follows:

f. *cardui* L.: Jerusalem, Wadi el Kelt, Jordan, Ramat Gan, Carmel 3.III — 30.IV; Jerusalem 10.IV; Binyamina 12.IV; 'Ein Gev 17.IV.

var. *consobrina* Chevr.: Jerusalem 4.IV — 18.IV; Yarqon river 14.IV; Herzliya 22.IV; Ra'anana 25.III; Hadera 6.V; Carmel 9.IV; Mrar 5.V; Khreibe 16.IV; Nahalal 17.IV; Tiberias 24.IV; Deganya 10.III; Nir 'Am 21.III; Urim 15.V; Beersheba 1.IV.

Distribution: C. Europe to Caucasus, Iran, the whole Mediterranean coast, including Egypt, to Asia Minor. FE: E/CM.

Agapanthia violacea F. Bod. 1937, Heyr. 1948

Jerusalem 12.III — 29.IV; Ra'anana 25.III; Nazareth 4.V.

Distribution: the whole of Europe to Siberia, Asia Minor to Turkestan, Israel. FE: ES/EM/IT.

?*Agapanthia lais* Rche. Sahlb. 1913, Plav. 1930, Bod. 1937

Jerusalem (Plav.); Qishon valley, Nazareth 29.III (Sahlb.).

The author has not seen a single specimen of *A. lais* from Israel, and it is possible that some of the records given above refer to the following species, which is very similar, though it is not mentioned by the authors above.

Distribution (according to Plav.): Morea, Macedonia, Israel, Syria, Sinai, Iran. FE: EM.

**Agapanthia osmanlis* Rche. Heyr. 1948

Jerusalem 4 — 21.IV; Wilhelma 21.III; Holon 15 — 28.III; Gat 12.III; Nir 'Am 12.III; Beit Lid 1.IV; Binyamina 20.III; Carmel 2.IV; Sarid 11.IV; Nahalal 17.IV; 'Afula 8.III; Mishmar Hayarden 29.IV; Dan 16.IV — 30.V; Metulla 24.III; Elon 8.V.

This is the commonest of the blue *Agapanthia* species, and most of the earlier records of *A. violacea* and *A. lais* may refer to it.

Distribution: Turkey, Transcaucasia, Asia Minor, Syria, Israel. FE: EM.

Oxylia duponcheli Brllé var. *languida* Muls. Figure 13. Sahlb. 1913, Bod. 1937

Jerusalem 19.IV — 1.V, on *Anchusa*; Rishon le Zion 22.III; Brorhayil 20.III — 15.IV, on *Anchusa;* Nahalal 17.IV; Kfar Kana; Nazareth 29.III (Sahlb. as *O. duponcheli*).

Distribution: Asia Minor, the Lebanon, Israel. FE: EM.

Coptosia compacta Mén. 1832 (syn. *C. sancta* Reiche 1877) Bod. 1937, Heyr. 1948 (as *C. sancta* Rche., type loc.: Nazareth)

This synonymy has been kindly established by Dr. St. Breuning, who examined the type of *C. sancta* Rche. in the coll. Mus. Hist. Nat. Paris (letter to Dr. Heyrovsky).

Distribution: Transcaucasia, Asia Minor, Cyprus, the Lebanon, Israel (so far known only from the type locality of *C. sancta* Rche.). FE: EM.

**Coptosia ganglbaueri* Pic (L'Echange 1936, p. 3, type loc.: Jerusalem) (nom. nov. pro *C. sancta* Ganglbauer 1884 nec *sancta* Rche. 1877). Figure 12. Heyr. 1950

Jerusalem 4 — 21.IV; Ra'anana 25.III; Giv'at Brenner 5.III.

Distribution: Israel. FE: EM; End.

**Coptosia nigrosuturata* Heyr. Figure 14. Heyr. 1950 (as *C. ganglbaueri* Pic ab. *nigrosuturata* n. ab.)

Jerusalem 1.V; Carmel 1.IV; Dalia (type).

Heyrovsky attributed this form with some doubt to *C. ganglbaueri*. Now that I have before me 3 specimens all exactly alike, I am certain it must be treated as a valid species. The three *Coptosia* species can be distinguished as follows:

1. Pronotum much broader than long, legs light red . . . *C. compacta* Mén.
— Pronotum broad as long (quadrate), legs dark brown to black 2
2. Elytra brassy black, 3 longitudinal lines of white tomentum beside the sutural band 7 — 10 mm . . . . . *C. ganglbaueri* Pic.

— Elytra reddish brown, along the suture blackish brown; no white longitudinal lines beside the sutural band; tomentum red-brown; 13 — 14 mm. *C. nigrosuturata* Heyr.

**Pilemia hirsutula* Frön. Heyr. 1948, 1950

Jerusalem 21.III — 23.IV; Deganya 18.III — 3.IV, in large numbers, copulating on *Eremostachys*.

Distribution: through Europe to Asia Minor, the Lebanon, Israel. FE: E/EM.

Phytoecia flavescens Brllé Bod. 1937

According to Heyrovsky 1948: misidentification. The name undoubtedly refers to the following species. Distribution: Greece. FE: End. (EM).

Phytoecia orbicollis Rche et Saulcy (type loc.: Nablus)

The colour forms *adelpha* Gglb., *schmiedeknechti* Pic, *damascena* Pic, and others occur in the Lebanon and Syria (Heyrovsky 1937).

Distribution: Asia Minor, Kurdistan, Syria, the Lebanon, Israel. FE: EM.

Phytoecia ferrugata Gglb. Bod. 1934, 1937, Heyr. 1948

Jerusalem 29.III — 3.V; Holon 15.III; Natanya 13.III; Carmel 26.III; Deganya 3.III; Jebel Jermak (900 m) 12.V.

ab. *houskai* Heyr. (1948) occurs sparingly among the type form: Jerusalem (type); Mishmar Ha'emeq 12.IV.

Distribution: Syria, Israel. FE: EM.

Phytoecia humeralis Waltl f. (ssp.?) *frontalis* Chevr. (syn. f. *bethaniensis* Pic)

Sahlb. 1902—03, 1913, Bod. 1934, 1937, Heyr. 1948, 1950

Sahlberg and Bodenheimer refer to *P. humeralis* Waltl, but I have not seen in Israel any specimen of the type form which has been described from Turkey. Most of the specimens are referred to *P. frontalis* Chevr., which, at least in Israel, may be treated as a subspecies, with 3 other aberrations occurring sparingly with it.

f. *humeralis* Waltl: Jericho 27.II; Khan Khatrura 16.III; Carmel (Haifa) 26.III (all Sahlb.).

ssp. *frontalis* Chevr.: Judea, Galilee, various localities 14 — 30.III (Sahlb.); Jericho III (Bod.); Wadi el Kelt Police Station; Wadi el Kelt 28.II — 30.IV; Jerusalem 11.III — 5.IV; Miqve Israel 20.III; Wilhelma 21.III, 'Eqron 7.III; Brorhayil 25.IV; Binyamina 25.III; 'Ein Harod 5.III; Beisan 31.III; Deganya 3.III; El Hamme 20.III.

ssp. *humeralis* ab. *insignata* Chevr.: "with f. *bethaniensis* Pic 3.III — 19.V" (Heyr. 1948).

ab. *bytinskii* Heyr.: Jerusalem (type) (Heyr. 1948); transitory specimens also Jordan, Al Maghtas 24.I; Jerusalem 24.IV.

ab. *scapulata* Muls. (Bod. 1937): I have not seen so far any specimens with the 4 basal antennal joints and the middle tibiae red.

Distribution (of *P. humeralis* in spec.): Turkey, Rhodes, Asia Minor, Cyprus, Syria, the Lebanon, Israel. FE: EM.

**Phytoecia pontica* Gglb. Heyr. 1948, Breuning 1951

Wadi el Kelt 17 — 24.III (Heyr. 1948); Haifa (Breun. 1951); Kinneret 20.IV; Rosh Pina 29.III.

Distribution: Asia Minor, Syria, Israel. FE: EM.

Phytoecia millefolii Ab. Sahlb. 1912—13, Bod. 1937

'Ein Fara (near Jerusalem) 18.III (Sahlb.); Miqve Israel III; Kfar Vitkin 1.III; Bet Halevi 27.III.

Distribution: Crimea, Caucasus, Iran, Asia Minor, Syria, the Lebanon, Israel. FE: EM.

Phytoecia rubropunctata Goeze Bod. 1937

According to Heyrovsky 1948: misidentification. A specimen determined thus in the coll. Div. Plant Prot. proved to be *P. wachanrui* Muls.

Distribution: C. Europe to Czechoslovakia, France, Italy. FE: E/pen. Med.

**Phytoecia astarte* Gglb. Heyr. 1948

Jerusalem 19.IV (Heyr.).

A very rare species in this country, more common in the Lebanon.

Distribution: Transcaucasia, Asia Minor, the Lebanon, Israel. FE: EM.

Phytoecia nigripes Voet. Bod. 1937

According to Heyrovsky (1948): misidentification. I could not trace the source of Bodenheimer's record, which probably refers to the preceding species.

Distribution: C. and S. Europe, east to Siberia, Syria. FE: ES/Med.

Phytoecia wachanrui Muls. Sahlb. 1912—13, Bod. 1934, 1937, Heyr. 1948

Khan Khatrura 16.III, on *Carduus;* 'Ein Fara (near Jerusalem) 18.III; Jerusalem 11.III — 30.IV; Binyamina 11.II; Zikhron Ya'aqov 30.III; Carmel 2.IV.

Together with the following form:

ab. *jezabel* Rche et Saulcy (Figure 15): Jerusalem (type loc.); Khan Khatrura 29.II; Rosh Haniqra 20.III. A transitory specimen, with the head red and only the thorax black, Zikhron Ya'aqov 30.III.

Distribution: Turkey, Asia Minor, Syria, the Lebanon, Israel. FE: EM.

**Phytoecia merkli* Gglb. Heyr. 1948

Jerusalem 9 — 13.III (Heyr.).

Distribution: Asia Minor, Syria, Israel. FE: EM.

**Phytoecia modesta* Waltl Sahlb. 1912—13

Qishon valley 31.III (Sahlb. 1 specimen); Huliot 22.III, on alfalfa.

The species is more common in the Lebanon.

Distribution: Asia Minor, Syria, the Lebanon, Israel. FE: EM.

Phytoecia coerulescens Scop. (syn. *virescens* F.) Sahlb. 1912—13 (as *virescens*), Bod. 1937, Heyr. 1948

Jericho; Wadi el Kelt Police Station 28.II; 'Ein Fara (near Jerusalem); Jerusalem 3.III — 1.V; Karkur 5.IV; Lake Tiberias 11 — 28.III.

Distribution: C. Europe to Caucasus, Siberia, S. Europe, N. Africa, Asia Minor, Syria, the Lebanon, Israel. FE: ES/CM.

Phytoecia cylindrica L. Sahlb. 1902—03, Bod. 1937

Jericho 28.II (Sahlb.).

According to Heyrovsky (1948): misidentification. A specimen in the coll. Div. Plant Prot. proved to be *P. manicata pubescens* Rche.

Distribution: the whole of Europe to Siberia, Asia Minor, Syria. FE: ES/pen. EM.

Phytoecia geniculata Muls. var. *nazarena* Rche. (type loc.: Nazareth, Reiche 1877)

Bod. 1937 (as *geniculata* Muls.), Heyr. 1948, 1950

Wadi el Kelt; Jerusalem 3.III — 20.IV; Holon 28.III; Binyamina 12.IV; Haifa 2.III — 11.IV; Merhavia IV; Mishmar Ha'emeq 14.IV; 'Ein Harod 5.III; Deganya 11.II.

f. *palaestina* Pic is probably a synonym to var. *nazarena* Rche.

Distribution (of *P. geniculata* Muls.): Greece, Turkey, Asia Minor, the var. *nazarena* Rche is known only from Israel. FE: EM.

Phytoecia manicata Rche et Saulcy and var. *pubescens* Pic (syn. *P. glaphyra* Daniel)

Sahlb. 1092—03 (as *manicata*), 1913 (as *glaphyra*), Bod. 1937 (as *manicata*), Heyr. 1950 (as *manicata* and *pubescens*)

var. *manicata* Rche et Saulcy: Jericho 28.II (Sahlb. 1902—03); Miqve Israel 20.III (Heyr 1950).

var. *pubescens* Pic.: Binyamina 25.III; Alonim 27.III; Sha'ar Ha'amaqim 2.III; Nahalal 17.IV; 'Afula 28.III; 'Amir 31.III (all. det. Heyr.); Haifa 3.IV (Sahlb. 1912—13 as *glaphyra*).

All the specimens seen by the author belong to the var. *pubescens* Pic, and it is possible that the records of *manicata manicata* Rche et Saulcy refer only to old specimens with the tomentum rubbed off. Heyrovsky (1950) considers both forms as distinct species.

Distribution: Balkans, Asia Minor, Syria, Israel. FE: EM.

Phytoecia croceipes Rche et Saulcy (syn. *P. longicollis* Costa) and var. *annulifer* Pic

Bod. 1937 (as *longicollis*, probably according to Winkler's Cat. Coleopt.), Sahlb. 1912—13 (as var. *annulipes* Pic!)

Nazareth; Qishon valley 30 — 31.III.

I have only 2 specimens from Binyamina 25. III, det. as var. *annulifer* Pic by Heyrovsky, which have the midfemora almost entirely and the hind femora completely black.

Distribution: Turkey, Asia Minor, Syria, the Lebanon, Israel. FE: EM.

Phytoecia coerulea Scop. ssp. *bethseba* Rche et Saulcy — Sahlb. 1902—03, 1913, Bod. 1934, 1937, Heyr. 1948

Jordan, Al Maghtas 24.II; Jericho 28.II — 13.III; Wadi el Kelt; 'Ein Fara 18.III; Jerusalem 1.IV — 1.V; Qiryat 'Anavim III; Miqve Israel 20.III; Holon 28.III; Ramat Gan 3.III — 30.IV; Natanya 13.III; Haifa 28.III; Carmel (Haifa) 8 — 10.IV; Lake Tiberias 29.III; Daphne Oaks 4.III; Mar Saba Convent 16.III; Beersheba 26.III.

Sahlberg (1912-13) mentions also the typical *P. coerulea* (as var. *rufimana* Schrk.) from Jericho and Jerusalem 11 — 18.III, but I have never seen a specimen with the front legs partially red.

Distribution: Asia Minor, Israel, Egypt. FE: EM.

Phytoecia virgula Charp. var. *major* Pic — Sahlb. 1902—03, 1913, Bod. 1934, 1937, Heyr. 1948, 1950

Sahlberg and Bodenheimer quote *P. virgula* Chevr. only, but the large majority of the specimens seen by Heyrovsky and the author are larger than Central European ones, and belong to the var. *major* Pic.

Jerusalem 28.III — 30.IV; Sarona (near Tel Aviv) 4.III; Ra'anana 25.III; Natanya 13.III; Haifa 28.III; Khreibe Oaks 16.IV; El Hamme 20.III; Dan 22.III — 25.IV.

Distribution (of var. *major* Pic): Syria, the Lebanon, Israel. FE: EM.

?*Blepisanis vittipennis* Rche — Bod. 1937

I have not seen any species of this genus (or subgenus of *Phytoecia*) and I do not know on what authority Bodenheimer's record is based. The occurrence in Israel is, however, likely.

Distribution: Balkans, Turkey, Asia Minor, Syria, FE: EM.

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PLATE I

(1) *Notophysis rugiceps* Pic ♂. Neallotype. (2) *Prionus unipectinatus* White. (3) *Rhesus serricollis* Motsch. (4) *Phoracantha semipunctata* F. (5) *Criocephalus syriacus* Rtt. (6) *Cerambyx velutinus* Brllé ssp. *centurio* Czwal. (7) *Batocera rufomaculata* De Geer. (8)*Purpuricenus desfontainesi* F.; ab. *inhumeralis* Pic above; ab. *corvinicollis* Plav. below. (9) *Aromia moschata* L. ssp. *thoracica* Fisch. (10) *Clytus bytinskii* Heyr. Holotype. (11) *Chlorophorus madoni* Pic. (12) *Coptosia ganglbauri* Pic. (13) *Oxyliat duponcheli* Brllé var. *languida* Muls. (14) *Coptosia nigrosuturata* Heyr. Holotype. (15) *Phytoecia wachanrui* Muls. ab. *jezabel* Rche et Saulcy. (16) *Apomecyna arabica* Breun. (17) *Crossotus arabicus* Gah.

(1—9,13,17: × 1; 10,12,14,15: × $1\,^1/_2$; 11,16: ×2).

A CONTRIBUTION TO THE KNOWLEDGE OF THE CHALCIDIDAE, LEUCOSPIDIDAE AND EUCHARITIDAE (HYMENOPTERA, CHALCIDOIDEA) OF THE NEAR EAST

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ABSTRACT

This paper contains notes on 50 species of Chalcididae, 5 species of Leucospididae and 8 species of Eucharitidae from Turkey, Cyprus, Syria, Iraq, Israel and Egypt; one species from Iran is described.

The following species are described as new:

Brachymeria **notispina,** n. sp.; *Brachymeria libyca* (Masi), new male; *Hockeria* **brachygaster,** n. sp.; *Eucepsis* **similis,** n. sp.; *Invreia* **novitzkyi,** n. sp.; *Invreia* **israêlica,** n. sp.; *Peltochalcidia clypeata* Boucek, new male; *Lasiochalcidia* **sparsibarbis,** n. sp.; *Lasiochalcidia cincticornis* (Walker), new male; *Dirhinus cyprius* Masi, new female; **Pachyeucharis,** n. subg. in *Eucharis* Latr.; *Eucharis* (*Pachyeucharis*) **microcephala,** n. sp.; *Eucharis* (*Pachyeucharis*) **albipennis,** n. sp.; *Eucharis* (*Pachyeucharis*) **affinis,** n. sp.; *Eucharis* (*Pachyeucharis*) **nigriventris,** n. sp.; *Eucharis* (subg. **Eucharisca,** n. n. for *Chalcurella* Gussakovskij, not Girault) **bytinski-salzi,** n. sp.

Nomenclatoric and taxonomic changes: *Chalcis brevicornis* Klug, n. syn. to *Brachymeria minuta* (L.); *Neophasganophora palestinensis* Boucek, n. syn. to *Aphasganophora gallica* (Sichel); *Antrocephalus goliath* Nikolskaja, n. syn. to *Eucepsis hofferi* (Boucek); *Eucepsis mansues* (Nikolskaja), n. comb.; *Antrocephalus subelongatus* (Kohl), n. comb.; *Invreia pumila* (Klug), n. comb.; *Lasiochalcidia rubripes* (Kieffer) separated as valid species from *L. cincticornis* (Walker); *Lasiochalcidia agilis* (Klug), n. comb.; *Lasiochalcidia pubescens* (Klug), n. comb.; *Eucharis punctata* Forster, *E. acuminata* Ruschka and *E. anatolica* Boucek transferred to *Pachyeucharis*, n. subg.

The description of *Brachymeria argenteopilosa* (Radoszkowski) is completed. Many of the species are new for this territory.

The present paper summarizes descriptions of new forms and notes on some other species of the hymenopterous families Chalcididae, Leucospididae and Eucharitidae from the Eastern Mediterranean. The material of these chalcids was kindly submitted to me by Dr. H. Bytinski-Salz, Israel, Mr. G. A. Mavromoustakis, Cyprus, and Ing. S. v. Novitzki, Vienna, for identification. This material was supplemented by several forms from the collections of the National Museum in Praha and the Museum in Vienna, and one species was submitted to me by Mr. G. J. Kerrich of the British Museum, London, to whom I am indebted for his kindness in comparing several species of *Eucepsis* with types in the British Museum. I wish also to record my gratitude to Dr. M. Beier of the "Naturhistorisches Museum" in Vienna for the loan of some types.

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CHALCIDIDAE

Brachymeria femorata (Panzer)

Cyprus: Limassol; Pera Pedi; Moni River; near Cherkes; near Zakaki (Mavromoustakis).

Israel: Beersheba, 13.VI; 'Ein Gedi, 24.IV, from pupae of *Pyrameis cardui* (L.) (Bytinski-Salz).

Abundant everywhere in the Mediterranean region, parasitizing pupae of many species of Lepidoptera. Most specimens have black spot on the outer surface of hind femora much reduced or absent.

Brachymeria albicrus (Klug)

Israel: Jericho, 22.VII.1946, one male, from a pupa of *Danaus chrysippus* (L.) (Bytinski-Salz).

The species runs in the key of Masi (1951, EOS. tomo extraord. 1950: 27—58) to the above named species, but neither the original description of Klug (1829, Symb. Physicae, pl. XXXVII, fig. 10), nor any later paper, except the cited key, mention whether the second tergite is punctate or not. The specimen from Israel has the second tergite coarsely punctate, and the scutellum possesses a double spot of silvery hairs similar to, e.g., *B. femorata* (Panz.). Hind femora are dark reddish-brown, except the ivory white apex.

Known as yet only from north-eastern Africa (Egypt to Somalia).

Host: Lepidopterous pupae, e.g. *Danaus chrysippus* (L.).

Brachymeria kassalensis (Kirby)

Israel: Wadi el Kelt near Jericho, 7.II.1943, one male (Houska).

Known as yet only from north-eastern Africa, from the same countries as the preceding species. Develops in lepidopterous pupae, e.g. *Chaerocampa elpenor* (L.).

Brachymeria intermedia (Nees)

Cyprus: Fassouri; Cherkes; near Limassol; near Zakaki; Yermasoyia Hills (Mavromoustakis).

Israel: Jerusalem, 25.VIII; Haifa, 12.VI; Qiryat Shmone, 21.VI (Bytinski-Salz).

Abundant as *B. femorata*, parasite of many Lepidoptera. Yellow coloration of hind femora usually spread over the entire distal half.

Brachymeria argenteopilosa (Radoszkowski)

Chalcis argenteopilosa Radoszkowski 1876, Horae Soc. ent. ross., **12**, 150.

Egypt: Assiut, one female and two males (Reimoser).

Described originally from Egypt. Species is near to *B. intermedia* (Nees), but hind femora are extremely finely punctate, and punctation of body is generally much

denser and finer, especially on abdomen. Size smaller: 3—3.8 mm. Body covered with relatively dense but short, appressed snow-white pubescence, which on each part is combed in characteristic directions. On the face these hairs are directed down towards the mouth, on the occiput towards the sides, exactly from the middle; on the cervical part of the pronotum from the middle towards the sides, just behind the collar edge in a narrow stripe to the middle, behind this stripe again towards the sides and backwards at the hind margin of the pronotum; on the scapulae, lateral hairs are directed towards the middle part, and backwards posteriorly, on the inner half again sidewards; front half of mesoprescutum has hairs directed towards the head, but the inner ones more towards the middle, on hind half towards the median line and backwards, especially along the hind ends of the notaulices; hairs of axillae directed forward, on their hind margins again backwards and very dense there; on the scutellum the hairs of the middle part are turned towards the median line, other hairs along the sides, and there they are very dense.

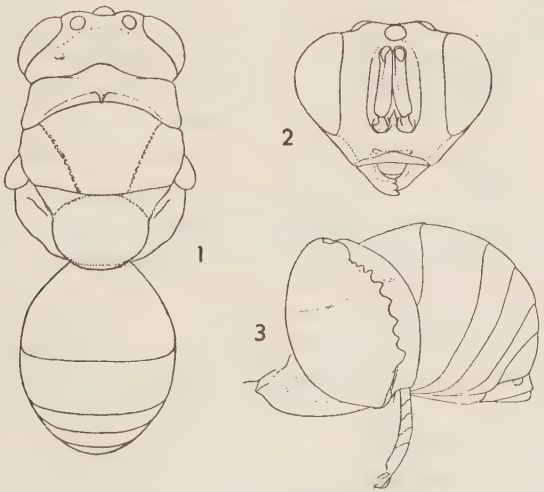
Entire hind surface of hind tibiae and apical spot on hind femora ivory white. Cheeks with no traces of carinae.

Brachymeria **notispina** n. sp.

Israel: Revivim, 13.VI, one female (holotype, lgt. et coll. Bytinski-Salz).

Female: 3.5 mm.

Body black; antennal flagellum apically reddish; tegulae, apical quarters of femora, tibiae and tarsi ivory yellowish white, front tibiae internally in the middle light reddish, hind tibiae in middle third reddish brown, at apex with small reddish spot, claws of all legs blackish; wings hyaline, venation brown, submarginal vein pale basally; pubescence of body white.



Figures 1—3

Brachymeria notispina n. sp. (1) Body from above; (2) head in facial view; (3) abdomen and hind leg in sinistro-lateral view.

Head coarsely punctate, shortly pubescent, hardly narrower than mesoscutum anterior to tegulae (57 : 58), in front view transverse (Figure 2), shortly roundedly triangular (57 : 42, or 57 : 40 when measured to lower clypeal margin). Eyes bare, very large, relative height of eye 30, minimum width of frons 29, maximum width of antennal scrobe 15.5, in the middle 15, length of cheek 12, length of antennal scape 19, antennal flagellum (with pedicel) 41. Frons not vaulted, antennal scrobe reaching to front ocellus, preorbital keel barely indicated, postorbital keel entirely absent, cheeks rather flat, frontogenal suture slightly carinaceous. Right mandible with three teeth. Antennal scape not reaching to front ocellus, not swollen. Flagellum relatively very slightly thickened; pedicel about as long as broad; ring-joint four times shorter than broad; funicle joints subequal in length, hardly increasing in width, only first funicle joint somewhat narrower, slightly transverse, the following joints more distinctly transverse, the last $1\frac{1}{2}$ times broader than long; club as long as two preceding joints together, the tip roundedly truncate, exactly on the tip with a small, round, impressed (certainly postmortal phenomenon) area.

Thorax robust (Figure 1), densely punctate, puncta on pronotum and mesoscutum transversely lengthened; interspaces twice to three times smaller than the puncta, transversely microscopically wrinkled, on scutellum nearly smooth. Pubescence short, hairs not appressed. Pronotum scarcely narrower than mesoscutum, and its sides very slightly converging forward. Collar carina developed only on the sides. Hind margin of pronotum shallowly and broadly emarginate, bordered by a preapical carina, which is raised in the middle in a sharp spine directed obliquely backwards (Figure 1). Smooth, polished stripe between this carina and hind margin of pronotum narrowing sidewards, fading at notaulices. Scutellum slightly transverse (34 : 30, without axillae), distinctly vaulted, its raised margin almost regularly rounded posteriorly. Propodeum without teeth, alveolate, bottom of alveolae smooth.

Hind femur (Figure 3) oval, relative length 53, maximum width (with teeth) 33, its outer surface simply and rather finely, crowdedly punctate, similarly to that in *B. rugulosa* (Forst.) Lower margin with 9 or 10 teeth, ventrally at base without elevation. Hind tarsus robust, similar to that in *B. intermedia* (Nees), individual segments closely joined to each other. Wings very shortly pubescent, margin very shortly ciliated, ciliation anteriorly hardly visible. Relative lengths: costal cell 50, marginal vein 19, postmarginal vein 8, radial vein 3.

Abdomen shortly oval, shorter than thorax (Figures 1, 3), sixth tergite, epipygium and ovipositor not visible from above. First tergite smooth, only in the middle anterior to hind margin with a group of single microscopic puncta; second tergite finely punctate, coarser piliferous puncta on its sides very shallow; third to fifth tergites with almost uninterrupted stripes of piliferous puncta (and hairs), between them finely transversely wrinkled, otherwise finely not densely punctate. Sixth tergite covered with hairs, piliferous puncta coarse.

Male not known, host not known.

This species belongs to my second group (see: Acta ent. Mus. Nat. Pragae, **27,** Suppl. 1, 21), especially near the European species *B. rugulosa* (Forst.) and *punctulata* (Forst.). The most exclusive and striking character by which *B. notispina* n. sp. differs from all other species of *Brachymeria* Westw., is the spine-like tooth on the pronotum.

Brachymeria punctulata (Forster)

Syria: Aleppo, 16.VI.1934 (Novitzky).

Ascertained hitherto in Central and Southern Europe and Asia Minor. One of the smallest species of the genus, with short, round abdomen in female, dull hind femora which are distinctly shagreened between the fine puncta, and with distinct dark basal ring on hind tibiae.

Brachymeria vitripennis (Forster)

Turkey: Usak east of Smyrna, V.1934 (Novitzky).

Also one of the smallest species of the genus, with characteristically sparsely and finely punctate outer surface of hind femora, nearly smooth below apically. Hitherto known only from Central and Southern Europe, and Transcaucasia. Parasite of *Cassida* spp.

Brachymeria aegyptiaca Masi

Brachymeria aegyptiaca Masi 1931, Bull. Soc. ent. Egypte 1930, 216, 217.

Cyprus: Limassol, 16.IX.1952, one female (Mavromoustakis).

Israel: Binyamina, 29.V.1948, one female; Tel Aviv, 1.IX.1946, one female (Bytinski-Salz).

Species hitherto known only from Egypt and Somalia; in Egypt reared from the seed-capsules of cotton.

Brachymeria fonscolombei (Dufour)

Chalcis fonscolombei Dufour 1861, Ann. Soc. ent. France, **10**, 11; *Chalcis neglecta* Masi 1916, Ann. Mus. Stor. nat. Genova, **47**, 84; *Brachymeria neglecta* auct. *Brachymeria fonscolombei* Masi 1951, EOS tomo extraord., pp. 34, 35, 39.

Cyprus: near Zakaki, 16.VI.1954, one female (Mavromoustakis).

Israel: Dorot, 27.VI, one female (Bytinski-Salz).

Species of very wide geographical distribution, mentioned from the Mediterranean region as well as from Eastern Asia. Parasite of Sarcophagidae.

Brachymeria vicina Walker

Cyprus: near Limassol (Mavromoustakis).

Israel: Kfar Yeroham, 1.VI (Bytinski-Salz); Jaffa, 18.VIII (L. Fishelsohn).

Egypt: ?Assiut (Reimoser).

In these countries there often occur specimens with hind femora wholly red except for the small yellow spot on apex, and without basal black colouring. Though this colouring of hind femora is quite rare (I have seen three males and one female from

these territories) and occurs only in the southern part of the geographic area of the species, it might lead to a misidentification of such specimens by chalcidologists who do not know this fact, and it is possible that such forms might be described as new species.

Parasite in puparia of Diptera (Sarcophagidae, Tachinidae, etc.).

Brachymeria minuta (Linnaeus)

Chalcis brevicornis Klug 1834, Symb. phys., Dec. 4, pl. 37, fig. 10; n. syn.

Cyprus: Limassol; Yermasoyia Hills; Yermasoyia River; Cherkes (Mavromoustakis).

Syria: Aleppo, 16.VI.1934, one female f. *brevicornis* (Klug) (Novitzky lgt.).

Israel: Jerusalem, 20.VII—25.VIII, three females of f. *brevicornis* (Klug) (Houska, Bytinski-Salz); Tiberias, one male f. typ., one male transitional to f. *brevicornis* (Bytinski-Salz lgt.).

Egypt: Assiut, one female of f. *brevicornis* (Reimoser lgt.).

This variable species has been reported many times from the Eastern Mediterranean. *B. minuta* (L.) f. *brevicornis* (Klug) was considered a valid species by Masi 1949 in his paper on some chalcid flies from Palestine (Boll. Soc. Ent. Ital., **79**, 92, 93). I cannot accept this opinion, although Masi enumerates in detail all the differences from the typical *B. minuta*. I had the opportunity to examine a large transitional series of *B. minuta* from typical form to *brevicornis* from Tunisia (Museum in Vienna) as well as from Cyprus, Egypt and Israel, and on the basis of a careful study of all supposed differential characters (morphological, such as sculpture of malar space, propodeal teeth, density of thoracic punctation, as well as differences in colouring, such as colour of scape, legs, especially of the hind pair) I have come to the conclusion that *B. brevicornis* is only an extreme form of the variable species *B. minuta* (L.), having hind femora black—red—yellow with black spot often reduced within red colour, or even red—yellow, and with very sparse thoracic punctation with shining interspaces, smooth malar space and somewhat more thickened antennal flagellum. Transitional forms of all these characters occur abundantly. Several specimens from Cyprus and Tunisia have hind femora black and yellow (or white) only, but are morphologically identical with the typical *brevicornis* from Palestine or Egypt. I consider therefore *B. brevicornis* (Klug) to be only a variety within the variable species *Brachymeria minuta* (Linnaeus).

Brachymeria libyca (Masi)

Chalcis libyca Masi 1926, Boll. Zool. gen. agr. R. Scu. sup. Agric. Portici, **18**, 301—304.

Syria—Mesopotamia: Djerabije, 25.VI.1910, three males; Tranke at the Euphrates, "3 m" before Deir es Zor, 1910, one male (Mesopot. Exp. Nat. Oesterr. Ver.).

This species was described from Cyrenaica in female sex and not reported again. It is very interesting in the form of the head, which is very transverse if viewed from above, almost narrower than pronotum, with smooth cheeks and lower temples broadening instead of narrowing backwards, bordered posteriorly with sharp edge. Eyes

not prominent. Thorax short, abdomen short — ovate, very high. The new male differs from the female only slightly by its antennae and by its abdomen. Antennae are light reddish, funicle more or less darkened above, not distinctly thickened in the middle, its joints here only $1\,1/2$ times broader than long. Underside of funicle with only very indistinct and very thin, sparse, obliquely distant hairs. Abdomen as long as thorax, not narrowed backwards, epipygium not visible from above. Size of male 4—5.5 mm (female 5—6 mm).

The male allotype from Djerabije deposited in Nat. Mus. Praha, cat. no. 3026.

B. libyca (Masi) was reared in Cyrenaica from the puparia of *Wohlfartia argentifrons* (Schiner), Sarcophagidae, Diptera.

Trigonura rubens (Klug)

Chalcis rubens Klug 1834, Symb. phys. Dec. 4, pl. 37, fig. 7; *Phasganophora rubens* Sichel 1865, Ann. Soc. ent. France, p. 358, 368; *Trigonura rubens* Masi 1931, Bull. Soc. ent. Egypte, 1930, 214—216.

Israel: Wadi Fukra, two females reared 10.V and VIII from branches of *Acacia spirocarpa* (Bytinski-Salz).

The species has been described from Ambukohl in the Dongola country in northern Sudan, and reported later by Masi from northern Egypt, where it was reared from the branches of *Acacia farnesiana*. The host is not known but it is probably a xylophagous beetle. The above specimens from Israel are only 6 mm long.

Belaspidia obscura Masi

Turkey: Kayseri, 9.VI.1934 (Novitzky).

Syria: Aleppo, 16.VI.1934 (Novitzky).

Similarly to the specimens reported by me from Turkey previously (Acta Ent. Mus. Nat. Pragae, **27**, 48), these specimens are not specifically different from the Central European ones. *Belaspidia meridionalis* Steffan 1951 (Bull. Mus. Paris, 2e s., **23** 378—379) is probably also only a variety of the same species. Host: *Apterona crenulella* (Bruand), Psychidae, Lepidoptera.

Neochalcis fertoni (Kieffer)

Turkey: Ulukisla, 5.VI.1934, one male (Novitzky).

Cyprus: Trachoni, VIII.1939, one female; Limassol, 5.X.1940, one male (Mavromoustakis).

Both specimens from Cyprus belong to the var. *barbara* (Benoist), i.e. with red thorax, but both are morphologically identical with the specimens from Southern Europe, North Africa and Asia Minor with more extensive black colouring. The male specimen from Turkey is wholly black (f. typ.). Parasite of aculeate Hymenoptera.

Neochalcis hippotoides (Masi)

Israel: Jerusalem, 7.V.1943, one female; Binyamina, 15.V.1940, one female (Bytinski-Salz).

These specimens differ in nothing from those from the Island of Giglio which I have seen. Species known hitherto only from Giglio in the Tuscan Archipelago and from Spain. Host not known.

Aphasganophora gallica (Sichel)

Neophasganophora palestinensis Boucek 1952, Acta ent. Mus. Nat. Pragae, **27**, Suppl. 1, 50; n. syn.

Israel: Beersheba, 31.III, two males and one female; 'Ovdat, 30.III, one female (Bytinski-Salz).

An examination of the above specimens has convinced me that my *A. palestinensis* is not specifically different from *A. gallica* (Sichel) but is only a colour variety. I did not find substantial morphological differences, and the males of both forms are quite similar, even in colouring. All females from Israel which I have seen belong to the var. *palestinensis* (Bck.). Parasite of Lepidoptera.

Hockeria unicolor Walker

Turkey: Brussa, 2.VII.1934 (Novitzky).

Rhodes: 15.VIII.1934, one male and one female (Novitzky).

Widely distributed in the Mediterranean region and in Central Europe. Parasite of Lepidoptera.

Hockeria bifasciata Walker

Turkey: Fevzipasa, Amanus, 15.VI.1934; Antioch, 17.VI.1934 (Novitzky).

Lebanon: Cèdres de Becharré, 22.VI.1934 (Novitzky).

Widely distributed in the Mediterranean region. Parasite of Lepidoptera.

Hockeria **brachygaster,** n. sp.

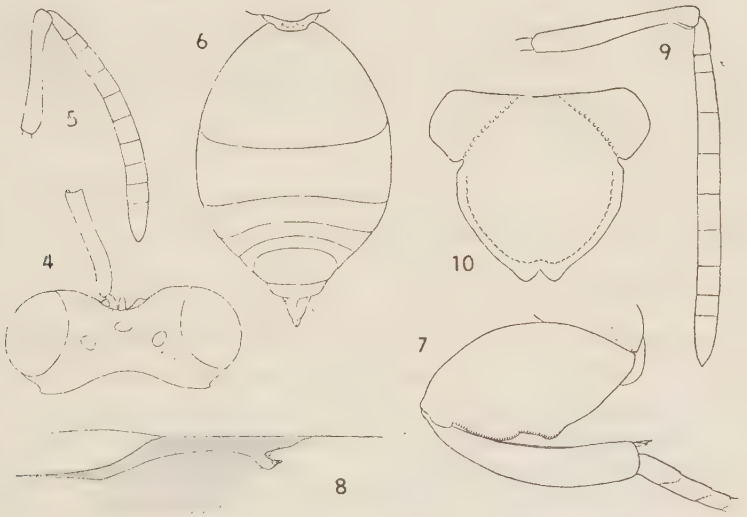
Israel: three females labelled "Fr. laboratory Tel Aviv, 18.XI.1937, Dr. Gabrielith, S.D.(E)105", and "No. 105", submitted to me by the kindness of Mr. G. J. Kerrich of the British Museum, London.

This new species is very similar to *H. hofferi* Bck. from Central Europe, mainly in its short abdomen in female, rather polished interspaces on thorax, and distribution of the fuscous colouring of the wings, but differs in testaceous basis of antennae, shorter radial (stigmal) and postmarginal veins, and closer sculpture of hind femora.

Female: 4.6—5 mm.

Body black; antennal scape, pedicel and following two joints testaceous, knees and tarsi of anterior and middle legs of the same colour, trochanters and tibiae of anterior four legs, and hind tarsi infuscate, tibiae lighter on the tips. Wings infuscate with hyaline basis and with transverse hyaline band with white oval spot distally from radial vein.

Head transversely triangular viewed from in front, its width distinctly greater than height measured from lower margin of clypeus (33 : 26). Cheeks converging downwards under angle of about 75°, nearly 1½ times shorter than height of eye (21 : 35). Frontogenal suture indicated by a slight carina. Eyes very shortly, almost indistinctly pubescent. Antennal scrobe not very deep, its bottom transversely reticulated. Interantennal lobe thin and semicircularly protruding. Scape not reaching ocellus, normal, as long as four last segments of funicle with club combined. Flagellum very moderately thickened (Figure 5). Pedicel as long as second funicle joint (the first funicle joint is here in reality the same as the ring-joint in males and in many other genera of Chalcididae). First funicle joint hardly longer than broad distally, distinctly shorter than the following joint (5 : 9) and a little narrower, second funicle joint by one half longer than wide (9 : 6), following joints hardly wider, cylindrical, but becoming progressively shorter, seventh funicle joint slightly longer than wide, preclava slightly broader than long, club very little longer than two preceding joints together (12 : 11), subconically pointed.



Figures 4—10

(4) *Hockeria brachygaster* n. sp., head from above; (5) antenna of female; (6) abdomen from above; (7) hind femur and tibia; (8) veins of fore wing. (9) *Eucepsis similis* n. sp., antenna of female; (10) scutellum.

Head and thorax covered with thin, fine, whitish, appressed pubescence. Dorsal surface of thorax not crowdedly punctate, interspaces between puncta generally about twice to three times smaller than diameter of each dot, relatively shiny but everywhere with shallow transverse reticulation, which is weaker on scutellum. Scutellum as long as broad behind axillae, measured with raised lateral margin, moderately vaulted; its apical lobes laminar, very broadly obtuse angled. Propodeum with low carinae, median area very narrow, somewhat broadened posteriorly, carinae accessoriae irregular, indistinct, carinae sublaterales very distinct behind concave areola stigmalis, strongly

converging backwards. Both lateral teeth distinct, the anterior much more raised, rectangular to slightly acute angled, situated just behind spiracle. Portion laterally of carina sublateralis with dense white hairs. Distance between middle coxae and carinaceously bordered antesternum (after Steffan) as long as second funicle joint, distinctly shorter than middle coxae.

Wings very similar to *H. hofferi* Bck. but radial vein (Figure 8) thicker and not distinctly longer than broad, postmarginal vein very little longer than radial one, and quite indistinct, whitish hyaline spot distally from radial vein extending in a complete band to hind margin of wing.

Hind femur (Figure 7) exactly twice longer than broad at proximal tooth, this slightly raised, roundedly obtuse angled, distal tooth very low and broad, with comb of about 25 denticulations, basally from it the comb has about 13 denticulations. Surface of femur dull, distinctly and densely shagreened (in proper sense). Hind tibia on its side towards femur with one outer and two inner longitudinal edges (*Hockeria* Walker s.str.).

Abdomen as long as thorax, oval (Figure 6), about $1\frac{1}{2}$ times longer than broad (42 : 27). First gastral tergite reaching the middle, with very shallow squamose sculpture, polished. Following tergites distinctly reticulated on the sides and beginning from the fourth also in the middle, and here opaque. Median keel of epipygium about as long as distance between pygostyles.

Male and host not known.

The holotype (one of the three females mentioned above) deposited in the British Museum, one paratype in the Museum in Praha.

Hockeria magna Boucek

Cyprus: Yermasoyia Hills, 21.VIII.1955, one male (Mavromoustakis).

Israel: Nahariya, 14.VI.1946, one female (Bytinski-Salz).

This species was previously known only from Central and Southern Europe and from Turkey. Its occurrence in Palestine is the most southern one and is rather surprising. Taxonomically, *H. magna* Bck. forms an intergrade between *Hockeria* Walker and *Neochalcis* Kirby by the double external edge on hind tibiae and long postmarginal vein (similarly to several other species). Host not known.

Euchalcis unicolor (Lucas)

Allocera unicolor Lucas 1871, Ann. Soc. ent. France, 1871, 16—18; *Euchalcis nuda* Boucek 1952, Acta ent. Mus. Nat. Pragae, **27**, Suppl. 1, 59, 60; *Euchalcis unicolor* (Lucas) Steffan 1953, Cahiers d. Natural., Bull. d. N. P.n.s. **8**, 8, 9.

Israel: 17 km south of Beersheba, 24.V, one female (Bytinski-Salz).

This species was previously known only from Algeria and Transcaucasia. The above cited specimen is the largest known yet, reaching the size of 11.5 mm. It is entirely black. The species was reared in Algeria from a Psychidae sp., Lepidoptera.

My *Euchalcis nuda* was correctly synonymized by Steffan 1953 with *Allocera unicolor* Lucas, the description of which has not been accessible to me until now.

Euchalcis hyalipennis Boucek

Israel: Revivim, 13.VI, two males (Bytinski-Salz).

Previously known only from the Sinai Peninsula and from Transcaucasia. Described after two males (1952, Acta ent. Mus. Nat. Pragae, **27**, Suppl. 1, 60, 61), size 3.5 and 4 mm. The above males from Israel are larger, 4.1 and 5.2 mm. Their feelers are identical in form with the feeler in Figure 142, pl. XVII in the paper cited.

Eucepsis mansues (Nikolskaja), n. comb.

Antrocephalus mansues Nikolskaja 1952, Chalcids of Fauna of U.S.S.R. (in Russian), p. 98.

Turkey: Adana, 13.VI.1934, one male (Novitzky).

Cyprus: Cherkes Forest, VIII.1939 (Mavromoustakis).

Transcaucasia (U.S.S.R.): Valley of Arax, one female.

Iraq: Baghdad, one female (Kálalová—Di Lotti).

Israel: Metulla, 28.VIII.1942; Wadi el-Kelt near Jericho, VI—VIII.1942 (Houska); Jericho, 26.V to 22.VIII.1943; Jerusalem, 1—26.VIII (Bytinski-Salz); 'Ein Farah near Jerusalem, 4.VII.1928 (R. Ebner); Kfar Yeroham, 1.VI, on *Acacia*; Tiberias, 16.V.1945 (Bytinski-Salz).

This species was previously known only from the south of European U.S.S.R. and from Central Asia (Nikolskaja, l.c.). The male mentioned by Steffan 1953 (Cah. d. Nat., Paris, n.s. **8**, 12) as *Eucepsis* sp. from Southern France most probably also belongs to this species, which seems to be quite abundant in the Mediterranean region.

E. mansues (Nik.) is very similar to *E. hofferi* (Bck.) and males especially are morphologically nearly identical. The legs are, however, to a larger extent or, in most cases, wholly red, hind femora including. The outer surface of hind femora in some males is more or less darkened to blackish, the inner side is, however, always reddish. The cheeks are shorter and broader than in *E. hofferi* and the punctation of hind femora somewhat finer. In *E. hofferi* the cheeks behind the frontogenal suture are distinctly, though weakly, longer than broad.

Probably parasite of lepidopterous pupae.

Eucepsis magrettii (Kirby)

Israel: Jerusalem, 3.VIII.1943, one female (Houska).

Known hitherto only from Somalia and Egypt.

This species is characterized mainly by isolated and intensively fuscous transverse bands on hyaline wings, by mostly black and wholly mat, extremely finely and very densely punctate shagreened hind femora. The extremely dense and rather deep shagreening of the femoral surface is still denser than similar sculpture on interspaces

between the puncta on sides of abdomen. First and second funicle joint (third and fourth antennal segment) silvery pubescent, from a certain angle strikingly lucid, the hairs similarly appressed and not longer than on the following joints.

The accurate identification of this species was not possible for me from the published descriptions. I therefore asked Mr. Kerrich of the British Museum to compare some of my specimens with the type of *Eucepsis magrettii* (Kirby), and I am most grateful to him for having done so. His comparison enabled me to recognize the following species as a new one.

Eucepsis **similis** n.sp.

Israel: Jericho, 30.VII.1942, one female, holotype (Bytinski-Salz).

Female: 8.2 mm.

Body black, red are: legs with exception of coxae, 3 basal antennal segments, tips of antennae, interantennal lobe, labrum, mandibles, tegulae, and tip of abdomen. Funicle dark reddish. Abdomen ventrally reddish-brown. Wings with two weak transverse brown bands, very weak below and here indistinctly joined, otherwise hyaline.

Body as in *E. magrettii* (Kby.) or *E. mansues* (Nik.). Head indistinctly wider than thorax anterior to tegulae (48 : 46), seen from above (in the direction of the bottom of the frontal cavity, scrobe) ratio 23 : 48, in the middle 11 : 48, viewed from in front 42 : 48 (or 41 : 48 when measured along median line from lower margin of clypeus). Eyes densely and very shortly pubescent. The horseshoe-like frontal keel low and in its whole extent equally high. Pterygial carina (from pterygium, external protruding wall of the antennal pit) short, arcuately bent upwards to lower margin of eye. Frontogenal suture indicated by narrow, distinctly carinaceous stripe. Clypeus very narrow, smooth. Punctation of cheeks only indistinctly coarser than on mesoscutum. Bottom of scrobe very finely horizontally reticulately wrinkled. Feelers filiform, not extremely thin (Figure 9). Scape a little shorter than following five joints combined (29 : 30). Pedicel and funicle joints in the following ratios: 14 : 6 : 15 : 15 : 15 : 14 : 12.5 : 10 : 7 : 17; minimum width of flagellum 6.5 (first funicle joint), maximum width 8.4 (club).

Punctation of thorax not very dense, interspaces between individual puncta on mesoscutum as large as one third of diameter of each dot, nearly smooth, with indistinct and shallow reticulation. Interspaces on scutellum somewhat smaller. Scutellum rather short (Figure 10), apical teeth roundedly obtuse angled. Lower margins of axillae with tufts of short silvery hairs. Similar pubescence on sides of propodeum posteriorly, especially on its vertical part. Lateral teeth of propodeum very obtuse, two on each side, integument between them and below this place devoid of pubescence.

Postmarginal vein of fore wing longer but thinner than marginal one, radial (stigmal) vein not thickened and very short.

Middle tooth of the three on hind femora weaker than the first or the third, the latter rounded.

Abdomen pyriform, very little shorter than head and thorax combined. Relative maximum width 42, length 86, first tergite 32, from petiole to hind margin of fifth tergite 50, second to fifth tergites 5 : 4 : 4 : 5, sixth tergite 8 seen from above, in reality

12 (sloping), narrower hind part of epipygium 14.5, protruding ovipositor sheaths 10. First gastral tergite very densely, finely punctate, only its sides anteriorly nearly smooth, following four short tergites very finely reticulate with several rows of coarse dots, which are interrupted in the middle. Sixth tergite coarsely punctate and covered with short appressed pubescence, closer than on the sides of preceding tergites.

Male not known, host not known.

In the diagnosis of the species the generic characters of *Eucepsis* Steffan were omitted, such as horseshoe-like keel on head, insertion and form of feelers, only partly separated collar, not bicarinate basis of first gastral tergite, three-dentate hind femur, hind tibia with single outer keel, etc. *E. similis* is very similar to the three other species of *Eucepsis* from this region and their differences are best seen from the following table.

Key to the species of *Eucepsis* known from the Mediterranean region:

1 Hind femora extremely densely and extremely finely punctate shagreened, very mat, legs nearly entirely black; wings with two isolated transverse fuscous bands; thorax very closely punctate, mat; third and fourth antennal joints in certain illumination strikingly silvery pubescent; Palestine, Egypt, Somalia. . . . . *E. magrettii* (Kby.)

— Hind femora more or less shiny, not so closely and extremely finely punctate, red or black; thorax not so closely punctate, with distinct interspaces between puncta, less mat; infuscate bands of wings lighter; basis of funicle not strikingly silvery pubescent. 2

2(1) Bands of fore wing distinctly isolated, rather well delimited; scutellum equally vaulted; hind femora red, very equally finely punctate shagreened; Palestine. . . . . *E. similis* Bck.

— Fore wing rather equally infuscate with two more distinctly infuscate bands, these not isolated and not delimited against the remaining surface of wing; scutellum rather flat along median line anteriorly; hind femora red or black, their punctation less fine and at least below at the dents with irregularly scattered larger puncta. 3

3(2) Hind femora black, hind tibiae red, fore and middle legs mostly black; distance between outer margins of lateral ocelli longer than one third of width of head; cheeks behind frontogenal carina higher than broad, especially in female; wings usually more infuscate; punctation of hind femora in male somewhat coarser; Southern and Central Europe, Central Asia, South Kazakhstan, Afghanistan, Iran. . . . . *E. hofferi* (Bck.)

— Hind femora mostly or entirely red, in male sometimes darkened outside, but internally always reddish; distance between outer margins of lateral ocelli exactly as long as one third of width of head; cheeks behind frontogenal carina broader than high, especially in male; wings usually less infuscate; Eastern Mediterranean, Southern Russia, Central Asia. . *E. mansues* (Nik.)

Eucepsis hofferi (Boucek) is not known as yet from the Near East but probably lives there, too. This species was described almost simultaneously by me (Acta ent. Mus. Nat. Pragae, **27**, Supp. 1, 54—56, May 1952, as *Antrocephalus hofferi* Boucek) and by M. N. Nikolskaja (Chalcids of the Fauna of U.S.S.R., p. 96, 97, June 1952, as *Antrocephalus goliath* Nikolskaja, n. syn.). Through the kindness of Mrs. Nikolskaja I have received a pair of her *A. goliath*. I have ascertained that the two species are identical, though the Asiatic specimens are somewhat larger than the Central European ones.

I am very much indebted to Mrs. Nikolskaja of Leningrad for giving me also some material of her *Antrocephalus mansues* Nik., which enabled me to establish the identity.

Antrocephalus hypsopygiae Masi

Cyprus: Yermasoyia Hills, 25.IX.1951, one male (Mavromoustakis).

This species has been reported hitherto from Cyprus and Turkestan. It parasitizes lepidopterous pupae, e.g. of *Hypsopygia costalis* (F.).

Antrocephalus subelongatus (Kohl), n. comb.

Halticella subelongata Kohl 1906, Denkschr. Akad. Wiss. Wien, **71,** 117, 118.

Lebanon: Beirut, 26.VI.1934, one male (Novitzky).

I was able to re-examine the type of this species described from Aden, and deposited in the "Naturhistorisches Museum" in Vienna. The female is still unknown. The species is a typical *Antrocephalus* Kirby, and very similar to or probably identical with one species of that genus, known to me in both sexes from Sumatra.

Solenochalcidia bucculenta Steffan

Israel: Wadi el-Kelt near Jericho, 14 and 28.VI and 12.VII.1942, four females (Houska); Jericho, 7.VII.1942, one male; 14 km south of Beersheba, 7.VI, one male (Bytinski-Salz).

This species has been described (Steffan 1951, Mém. Mus. Hist. nat., Paris, n.s.A Zool. **4,** 84—86) and was known hitherto only from Algeria. The female has bristle-like processes on the outer side of the fore tarsi similar to the combs in some fossorial wasps, e.g. pompilids, for digging in the sand. Thorax of female red, in male black.

Invreia ligustica Masi

Syria: Aleppo, 16.VI.1934 (Novitzky).

Known hitherto only from Central and Southern Europe, Tunisia, Cyprus and Iran.

Invreia rufitarsis (Illiger)

Cyprus: Cherkes Forest, VII.1939 (Mavromoustakis).

Syria: Homs, 20.VI.1934, one male (Novitzky).

Already reported from Cyprus by Masi 1934 (as *I. frequens* Masi, Ann. Mus. Stor. Nat. Genova, **57,** 8, 9), known also from Southern and Central Europe and from Anatolia.

Invreia **novitzkyi,** n. sp.

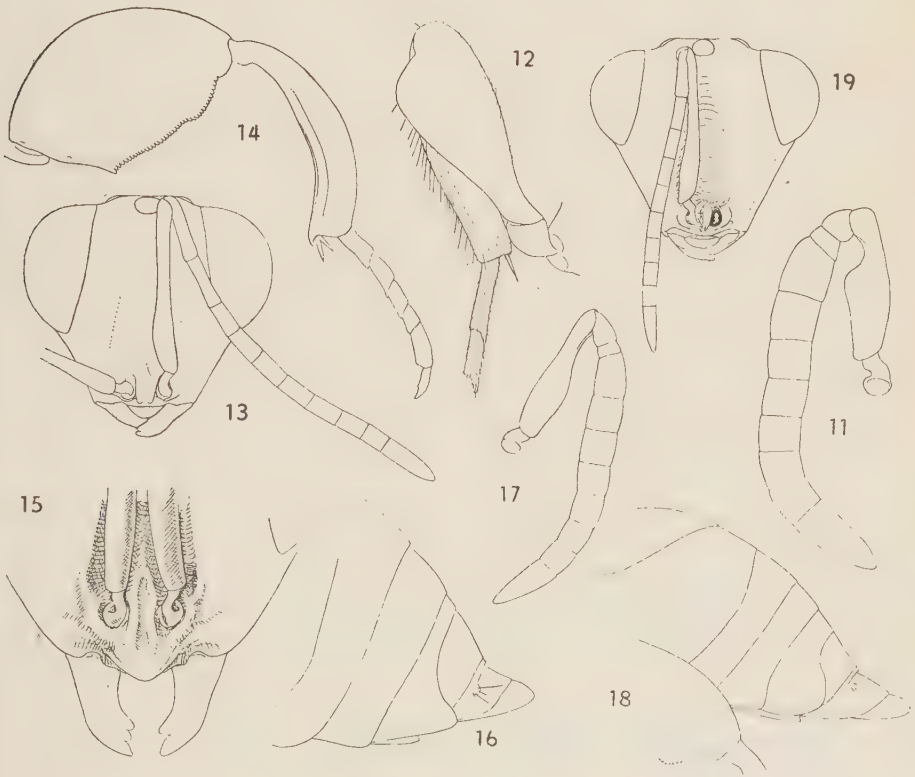
Syria: Aleppo, 16.VI.1934, two males, holotype and paratype (Novitzky).

This species is similar to *I. rufitarsis* (Ill.) and *I. mirabilis* Bck. by its strong, robust body but differs mainly by the antennae, mid femora, almost entirely red legs, and by distinct and dense white ciliation of hind margin of pronotum.

Male (female not known): 4.5 mm.

Body black; tegulae and legs including coxae red testaceous, flagellum beneath light reddish, abdomen also more or less reddish, in the paratype pronotum also reddish. Comb of hind femora and outer edge of hind tibiae blackish. Antennal scape and flagellum dorsally brownish black. Wings hyaline, venation brown. Pubescence white.

Head from in front triangularly trapezoidal, with considerably convergent cheeks, as high as width of frons and one eye together (or by the width of one eye broader than high). Face densely covered with silvery hairs directed downwards; scrobe bare, relatively deep and distinctly reaching anterior ocellus, on the bottom fine transverse striae. Puncta of face coarse and close, cheeks with a smooth, polished stripe. Head from the side relatively thick, not twice longer than thick (54 : 33), interantennal lobe not distinctly protruding, broad. Eyes large, prominent, nearly as high as width of frons just before anterior ocellus (33 : 35), cheeks considerably shorter than height of eye (21 : 33). Ocelli large ocellular line barely as long as diameter of posterior ocellus,



Figures 11—19

(11) *Invreia novitzkyi* n. sp., antenna of male, inner side; (12) mid femur and tibia. (13) *Invreia israelica* n. sp., head of female in facial view; (14) hind leg. (15) *Peltochalcidia clypeata* Boucek, clypeal region of male in facial view. (16) *Lasiochalcidia cincticornis* (Walker), apex of abdomen of female in sinistrolateral view; (17) antenna of male. (18) *Lasiochalcidia rubripes* (Kieffer), abdomen of female in sinistrolateral view. (19) *Lasiochalcidia sparsibarbis* n. sp., head of female in facial view.

distance between posterior ocelli equal to three diameters of one of them. Vertex in the middle not thick. Antennae relatively thick (Figure 11). Scape slightly flattened in the middle, with an obtuse, rounded tooth in three fifths of length, strongly semicircularly incised behind it, as long as flagellum up to one third of third funicle joints. Ring-joint distinct, twice broader than long, broadened distally. Funicular joints very weakly narrowed to the club, first funicle joint as broad as long ventrally, dorsally only by one quarter longer (its basis oblique), second joint as long as broad, the following slightly transverse. Club roundedly conical at apex, nearly as long as three preceding joints together, its two sutures slightly distinct, oblique.

Thorax strongly vaulted, only $1\frac{1}{2}$ times longer than broad, rather densely punctate, interspaces between puncta smooth, on the disk of mesonotum nearly as wide as the puncta themselves, disks of scapulae not punctate, most other parts of scapulae punctate, with interspaces much narrower than half diameter of one punctum. Hind margin of pronotum especially on sides with dense silvery ciliation. Scutellum slightly longer than mesoscutum, about as long as broad behind axillae, in front (with axillae) broader than long in a ratio of 55 : 40. Posteriorly its outline convergently rounded, margin slightly raised, especially behind, but not truncate. Propodeum strongly carinate, considerably sloping, very short, in the middle twice shorter than scutellum. Median area ellipsoidal, about twice longer than broad. Sublateral carinae in the middle high and crosswise elevated, together with similarly high carinae accessoriae and one secondary transverse carina, which is very much elevated, and separates the posterior, more sloping part of the lateral area from the stigmal areola. Sides much convergent backwards. Legs strong, with rather long pubescence. Middle femora (Figure 12) strongly clavate, flattened, basally very thin, underside entirely flat. Middle tibiae also enlarged. Hind femora ovate, less than twice longer than broad in the middle (62 : 37), sparsely punctate and pubescent. Basal tooth solid, as high as following three denticles. Comb between it and the distal tooth with 23 small denticles, rounded distal tooth with a comb of 12 denticles. Hind metatarsus dorsally about as long as fifth tarsal joint, ventrally twice longer. In the wing marginal vein relatively short, twice longer than the rudimental radial vein.

Abdomen ovate, less than twice longer than broad (40 : 26). First tergite reaches the middle (21 : 40), its hind margin semicircular, surface smooth and polished. Following tergites coarsely punctate and pubescent at hind margins, second tergite in the middle nearly smooth. Interspaces between puncta of abdomen smooth.

The holotype, cat. no. 3084, deposited in the collections of the National Museum in Praha.

The species is named in honour of the eminent European chalcidologist, Ing. S. v. Novitzky, my teacher in chalcidology, from Vienna, Austria.

Invreia nigerrima Masi

Turkey: Kara-Agac near Istanbul, VI.1934, one male; Yokari at Lake Amq, 17.VI. 1934, one female (Novitzky).

Cyprus: near Limassol, 28.V.1955, one male (Mavromoustakis).

Israel: Jerusalem, 29.VIII.1941 (Bytinski-Salz).

Known hitherto from Southern Europe, Anatolia and Cyprus.

Invreia subaenea Masi

Turkey: Fevzipasa, Amanus, 18.VI.1934 (Novitzky).

This species has been reported so far only from Central and Southern Europe, and from Anatolia.

Invreia **israelica,** n.sp.

Israel: Gat, 10.VIII, one female, holotype (Bytinski-Salz).

This new species is very reminiscent of *I. subaenea* Masi in its relatively slender and polished body, slender antennae and relatively sparsely punctate thorax, but differs from it by the scrobe reaching the ocellus, larger eyes, double external edge of hind tibiae, red legs and still larger interspaces between puncta on thorax.

Female: 4.8 mm.

Body black, antennae, tegulae and legs including coxae light red. Abdomen ventrally and mouth reddish. Wings subhyaline, at marginal vein slightly but distinctly infuscate, venation brown.

Head triangular viewed from in front (Figure 13), slightly broader than long (29 : 25), coarsely punctate and sparsely pubescent, puncta with narrow interspaces. Scrobe not very shallow, reaching anterior ocellus as front is concave, bottom of scrobe above insertion of antennae very finely transversely wrinkled, nearly smooth. Interantennal lobe grooved, small, but distinctly semicircularly protruding if seen from side, as broad as antennal pit. Cheeks sparsely dotted with several coarse puncta, without carina and suture. Eyes very large, prominent, from in front distinctly higher than width of frons at the anterior ocellus (34 : 27), nearly twice higher than length of cheeks (34 : 19). Left mandible with two teeth. Feelers very long and slender (Figure 13), flagellum nearly twice longer than height of head (45 : 24). Scape very slender, in basal quarter swollen, a little more than twice shorter than flagellum (21 : 45), slightly longer than pedicel with following three funicle joints together. Pedicel four times longer than broad apically, longer than first funicle joint, this narrowed in the middle, a little narrower than the following funicle joints, which are cylindrical, all distinctly longer than broad (width 4.5, relative lengths of individual funicle joints: 12 : 8 : 8.5 : 8.5 : 8.5 : 8.5 : 7 : 6.5, club 15), the solid club as long as the two preceding funicle joints together (6th and 7th funicle joints.)

Thorax not much vaulted, very similar in form to that of *I. subaenea* Masi, but punctation still sparser. Interspaces generally wider than puncta themselves, especially on mesoscutum and scutellum. Sides of pronotum subparallel, more than twice shorter than pronotal width (11 : 26). Mesoscutum distinctly shorter than scutellum, very transverse. Scutellum rounded, shorter than broad behind axillae (30 : 35; relative width with axillae 45), nearly flat, on the disk excluding margins with about 15 puncta; margins edge-like. Metanotum not visible from above in the middle. Propodeum along median line and its anterior half laterally nearly horizontal, sides weakly sloping backwards.

Carinae similar to those in *I. subaenea* Ms. but bottom of areae shinier, propodeum a little shorter and sides somewhat more convergent.

Legs with short pubescence. Middle femora clavate, hind femora ovate (Figure 14), very sparsely scattered with a few fine puncta, about $1\,^2/_5$ times longer than broad (60 : 37). Basal tooth not solid, the comb beginning on its apex, with 23 denticles up to the basis of distal tooth, this rounded and its comb with 15 denticles. Hind tibiae externally with two subparallel edge-like carinae in the place of one (as in *I. subaenea* Ms.), the side against femur before apex somewhat abruptly curved. Hind spurs nearly half as long as width of hind tibia at apex. Hind metatarsus dorsally slightly shorter than fifth tarsal joint.

Abdomen on first two tergites perfectly smooth, also following tergites everywhere without microsculpture, on the sides and posteriorly with sparse punctation and sparse pubescence.

Male not known. *Chalcis pumila* Klung 1834 (Symb. Phys. Dec. 4, pl. 37, Figure 13) from Arabia is also an *Invreia* sp., male, probably the same species as *I. israelica* Bck.

Invreia subarmata (Forster)

Turkey: Ankara — Yeni Sehir, 5.VI.1934, one female (Novitzky).

Known previously only from Central and Southern Europe.

Peltochalcidia clypeata Boucek

Cyprus: Yermasoyia Hills, 18 and 21.VIII.1955, one female and four males (Mavromoustakis).

This species has been known hitherto only from Transcaucasia (Boucek 1952, Act. ent. Mus. Nat. Pragae, **27**, Suppl. 1, 92, 93). The female from Cyprus is smaller (4.5 mm) than the holotype (6 mm). The male is still undescribed.

Male, new description. Very similar to that of *P. benoisti* Steffan, but differs from it mainly by the form of the clypeal roof. This is more triangular (Figure 15); when seen from the side, it narrows cuneiformly to the apex, as its side margins are slightly elevated. Interantennal callus longitudinally grooved, this groove hardly broader than the elevated and swollen margins which send out weak and low carinae in the roof (not so striking as in female). Thorax black, without metallic tinge. Legs except coxae and antennal flagellum red or somewhat infuscate, especially flagellum, front and middle femora, and hind tibiae. Punctation of thorax and head, especially on face, much closer than in female. Flat disk of the first tergite densely finely punctate, matt. Size 3.5 — 4 mm.

The allotype deposited in the Nat. Mus. Praha, cat. no. 3040.

Peltochalcidia benoisti Steffan

Cyprus: Limassol, 20.IX.1936, one female; Yermasoyia Hills, 25.IX.1951, one male (Mavromoustakis).

Known hitherto only from Southern and Central Europe and from Morocco. Its finding in Cyprus is therefore the easternmost one.

Peltochalcidia popovi Nikolskaja

Peltochalcidia popovi Nikolskaja 1954, Trav. Inst. zool. Acad. Sci. U.R.S.S., **16**, 410.

Egypt: Memphis, 1897, one female (Schmiedeknecht).

I wished to describe this species as new but in 1954 I received one pair from Mrs. Nikolskaja from Leningrad with the identification label: "*Peltochalcidia popovi* Nik." These specimens are paratypes which were collected by Rudolf in Kazakhstan at Charkin, on the lower course of the river Ural. Host not known.

Lasiochalcidia igiliensis (Masi)

Lebanon: Road from Beirut to Tripoli, 25.VI.1934, one female (Novitzky).

This species was previously reported only from Morocco, Algeria and the Island of Giglio in the Tuscan Archipelago. The type specimen from Giglio should be different somewhat from the specimens described and cited by me (Acta ent. Mus. Nat. Pragae, **27**, Suppl. 1, 104, 1952), and by Steffan (Mem. Mus. Hist. nat., Paris, n.s.A, Zool. **4**, 77, 78, 1951). The main differences between our specimens and that of Masi seem to be in the form of the hind femur, which was figured from the type by Masi (Ann. Mus. Stor. nat. Genova, **7**, 110—112, pl. XII, fig. 11). All specimens from North Africa and Palestine, studied by myself and Steffan, are identical, and belong to one species. We suppose that the differences from the specimen of Giglio are either within the range of individual variation, or due to the exactness of the drawing; in either case they are of no taxonomic value.

Lasiochalcidia dargelasii (Latreille)

Turkey: Kizil Irmak, 3.VIII.1951, one female (Wahrman).

Known hitherto only from Central and Southern Europe, Southern Russia, Transcaucasia and Algeria.

Lasiochalcidia cincticornis (Walker)

?*Chalcis pubescens* Klug 1834, Symb. phys., Dec. 4, pl. 37, fig.11 (male); ?*Chalcis agilis* Klug 1834, l.c. pl. 37, fig.12 (female); *Halticella cincticornis* Walker 1871, Notes on Chalcididae (III), p.42; *Lasiochalcidia cincticornis* Boucek 1952, not Steffan 1951, partly not 1953, not *Euchalcis rubripes* Kieffer 1899, 1904.

Cyprus: Limassol, 2—16.IX.1951 and 1952, two females; near Limassol, 22.V.1955, one female; Cherkes, 8.VII. one female; Cherkes Forest, VII.1939, one female (Mavromoustakis).

Egypt: Cairo, two males (one allotype).

Known hitherto from Algeria, Spain, France, Corsica, Greece, Bulgaria and Israel. Parasite of lepidopterous pupae.

Euchalcis rubripes Kieffer is not identical with this species. When I wrote my paper on the European Chalcididae, I knew only the form considered today to be the real *L. cincticornis*, and not the second form, which is very similar in colouring, and which

must be named probably *Lasiochalcidia rubripes* (Kieffer). This latter species was on the other hand known to Steffan, who at the time of his paper about *Lasiochalcidia* (1951) did not know the other form, known to me. In 1953 Steffan mentioned two forms under the name of *L. cincticornis*, but remarked already at the form with "un abdomen longuement conique": "(*Euchalcis rubripes* Kieff.)". This seems to be correct and, as I have found several other differences between the two forms with short (Figure 16) and long (Figure 18) epipygium in females, I consider them to be two valid species. The distinguishing characters are given under the second species.

Furthermore, I hope to have found the male of *L. cincticornis* (Walker) which was not previously known (but probably *Chalcis pubescens* Klug!). The male described briefly by Steffan under this name belongs to the other species, namely *L. rubripes* (Kieff.).

Male, new description. 4.8 mm. In coloration similar to the female (see e.g. Boucek 1952, l.c., p. 102) but feelers blackish, only pedicel somewhat reddish brown, legs mostly darkened, fore and middle femora infuscate, hind tibiae mostly blackish; inner side of hind femora, outer side apically, knees and tarsi testaceous. Pubescence of body somewhat longer. The main differences from the male of *L.* rubripes are in the form of the antennal scape. This is without tooth, only thickened in basal half and here about twice broader than in the narrowed distal half (Figure 17). The head is indistinctly broader than pronotum (37 : 35). Hind tibia abruptly more curved before apex, i.e. not equally as in male of *L. rubripes*.

The allotype deposited in the National Museum in Praha, cat. no. 3083.

Both species of Klug cited in the synonyms are most probably identical with this species which should thus be named *Lasiochalcidia pubescens* (Klug). *L. pubescens* (Klug) was described from Fajun, Egypt, *L. agilis* (Klug) from Dongola, North Sudan.

Lasiochalcidia rubripes (Kieffer)

Euchalcis rubripes Kieffer, 1899, Ann. Soc. ent. France, **68**, 369—371; *Lasiochalcidia rubripes* Boucek 1949, Acta Soc. ent. Cechosl., **46**, 144; *Lasiochalcidia cincticornis* Steffan 1951, and partim 1953 (male; and female from Corsica).

Lebanon: Tripolis, 25.VI.1934, one male (Novitzky).

Israel: Bat Yam, 15.V, three females and two males, 21.V, one female (Bytinski-Salz).

Known previously only from Corsica (Kieffer; Steffan 1953).

The main differences between *L. rubripes* (Kieffer) and *L. cincticornis* (Walker) are as follows:

1(2) Size generally larger, in most cases female 5.3 — 5.5 mm, body almost as robust as in *L. dargelasii* (Latr.); face of female flat between the less prominent eye and antennal insertion; head indistinctly broader than pronotum (37 : 35), the latter with nearly rectilinear sides and slightly converging forward; scutellum more vaulted along median line; epipygium of female short, its median keel about as long as the distance between pygostyls, seen from the side (Figure 16) dorsal epipygial edge and lower side of ovipositor sheaths in normal position in angle greater than 45°, angle between dorsal and ventral edges of compressed hind part of epipygium right to obtuse; male without tooth on scape (Figure 17), scape of female often darkened . . . . . *L. cincticornis* (Walker)

2(1) Size generally smaller, body less robust; face of female slightly concave between the more prominent eye and antennal insertion; head more distinctly broader than pronotum (35 : 30),

the latter apparently more rounded on the sides, these more convergent forward; scutellum less vaulted along median line (in side view); epipygium of female longer, its median keel about 1½ times to twice longer than the distance between pygostyls, from the side (Figure 18) its dorsal edge and lower side of ovipositor in smaller angle than 45°, angle between dorsal and ventral edges of compressed part of epipygium about 60°; male with distinct, subrectangular tooth on scape, in female scape always testaceous. . . . . *L. rubripes* (Kieffer)

Both species differ from *L. dargelasii* (Latr.) by the relatively smaller body, always testaceous legs and antennal basis in females (in *L. dargelasii* a rare variety with red legs also occurs: Algeria), shorter cheeks with much finer and denser punctation and therefore also closer silvery pubescence of cheeks. The tooth of scape in male of *L. dargelasii* is often acute angled.

Lasiochalcidia **sparsibarbis,** n. sp.

Iran: Teheran, Keredj, one female, holotype (F. Brandt).

This species is similar in its testaceous legs to *L. cincticornis* (Walk.) and to *L. rubripes* (Kieff.), but has sparse punctation on head, especially on cheeks, with thin sparse pubescence.

Female: 4.5 mm.

Body black with white pubescence; legs with exception of front coxae light red, scape, pedicel and first funicle joint of the same colour. Mouth parts and abdomen ventrally a little reddish brown. Wings subhyaline, venation brown.

Head triangular viewed from in front (Figure 19), slightly broader than high (31.5 : 28) measured from lower margin of clypeus. Relative measurements: width of mouth 11, length of cheek 13, height of eye 13.5, width of frons at anterior ocellus 15.5. Face between eye and antennal pit with area of rather dense, short and appressed silvery pubescence. Otherwise hairs of all other portions of head (as well as intermixed hairs on upper part of said area with more appressed pubescence) distinctly longer, more obliquely distant, rather erect, thin, so that they do not cover the surface completely. Cheeks especially are very sparsely pubescent, nearly smooth, with sparse, small and shallow punctation. Scrobe very shallow, nearly absent. Head from the side only about twice higher than thick (58 : 27, measured to upper margin of eyes 54 : 27). Feelers very slender, filiform (Figure 19). Scape reaching to ocellus, as long as part of funicle from basis of first to middle of sixth funicle joint. Pedicel and all following funicle joints nearly of the same width (4), gradually shorter; pedicel 12.5 : 4, first funicle joint 10 : 3.8, last funicle joint 6 : 4, club as long as two preceding joints together.

Thorax relatively short, robust. Pronotum very slightly narrower than head (29:31.5), very short, its sides strongly converging forward. Mesoscutum with scutellum hardly longer than width of mesoscutum. Punctation on them relatively a little sparser and larger than e.g. in *L. rubripes*. Scutellum a little shorter than its width behind axillae. Quadrangular area at teeth of propodeum with nearly even bottom, with one weak transversal carina. Otherwise carinae of propodeum very low, bottom of areolae smooth. Middle femora moderately clavate. Hind femora about twice longer than broad (60 : 32), with double (shorter and longer), not dense pubescence. Comb up to the basis of the distal tooth with 26 denticles, distal lobular tooth with about 15 denticles.

Abdomen as in *L. dargelasii*, rather short (43 : 26), highly polished and smooth except for sparse, shallow but large piliferous puncta on hind margins and sides of tergites 3 — 6. Epipygium very short, its median keel distinctly shorter than distance between pygostyls.

Male not known, host not known.

The holotype deposited in the Nat. Mus. Praha, cat. no. 3079.

Bucekia differens (Boucek)

Israel: Jerusalem, 23.VII.1939, one female (Bytinski-Salz).

This is the second specimen of the species from Palestine. The first is the type of *Lasiochalcidia differens* Boucek, collected by Houska in Wadi el-Kelt. The species has been so far reported only from Palestine and Senegal. The male was reared in Senegal from a pupa of Phycitinae sp.

Dirhinus cyprius Masi

Cyprus: Cherkes Forest, VII.1939, three males and one female; Fassouri, 24.IX.1946, one male and two females; Yermasoyia Hills, 25.IX.1951, one male, one female (Mavromoustakis).

Israel: Tel Aviv, 17.IX, one female (Bytinski-Salz).

This species was known hitherto only from Cyprus, in the male sex.

Female, new description: 4 mm long, very similar to the female of *D. hesperidum* (Rossi), from which it differs mainly by more distinct, coarser and sparser, parallel striae on first gastral tergite, as given in the key below. Both in males and females of *D. cyprius* I was not able to recognize with accuracy the differences from *D. hesperidum* in the form of head in side view, to which Masi's description called attention. It is possible that the figure of the head of *D. hesperidum* (Rossi) published in EOS, **23,** 57, 1947, is not quite correct, for the separation of stemmaticum is not marked, while, on the other hand, in the figure of the head of *D. cyprius* Masi in Boll. Soc. ent. Ital., **71,** 167, 1939, the stemmaticum seems to be marked too much. I consider therefore the shape of striation on the first tergite to be much more suitable for distinguishing between the two otherwise very simllar species. Feelers of female similar to those in *D. hesperidum*. Ring-joint slightly longer than broad apically, first funicle joint nearly twice longer than broad apically, its maximum width to that of pedicel as 6.5 : 4. Club nearly as long as three preceding funicle joints together (11 : 12.5). Feelers mostly dark, scape, pedicel and base of several following joints reddish.

Allotype, the female from Cherkes Forest in Cyprus, VII.1939, leg. Mavromoustakis, deposited in the coll. Nat. Mus. Praha, cat. no. 3041; other females are paratypes.

Dirhinus gussakovskii Nikolskaja

Dirhinus gussakovskii Nikolskaja 1952, Chalcids of Fauna of U.S.S.R. (in Russian), p. 86.

Cyprus: Trachoni, VIII.1939, one female; Episcopi Forest, 22.IV.1940, one female (Mavromoustakis).

This species was described from Central Asia; its occurrence in Cyprus is therefore rather surprising, though some species of *Dirhinus* are known to have very large areas of distribution. *D. gussakovskii* Nik. is quite well characterized by its relatively short and thick antennae and by vertical carinae on the inner walls of the horns of head. These carinae are parallel to the front edge of the horn, sloping towards the mouth.

Dirhinus sp., near *parotideus* Masi

Israel: Mishmar Hanegev, 10.XI, one male (Bytinski-Salz).

I was not able to identify this specimen with sufficient accuracy. The temples are somewhat swollen just behind the eyes, as depicted by Masi 1943 in his *D. parotideus*, but they are posteriorly sharply edge-like bordered and not rounded. The male specimen from Palestine differs from *D. excavatus* Dalm. by rather short, obtuse and low frontal horns.

Dirhinoides wohlfahrtiae (Ferrière)

Cyprus: Near Zakaki, 26.VII.1954, one female (Mavromoustakis).

This species has already been reported from Cyprus by Masi 1947 (EOS, **23**, 50, 51). It parasitizes the puparia of *Wohlfahrtia nuba* Wied., and is known from Cyprus, Israel, Egypt, Yemen and Somalia.

The differences between all *Dirhinini* from the Mediterranean region are given in the following key:

1 Horns of head rounded on tips, broad, in the middle of their lengths at least twice thicker than width of incision between them; Cyprus, Israel, Egypt, Yemen, Somalia. . . . . *Dirhinoides wohlfahrtiae* (Ferrière)

— Horns more or less pointed, narrower, incision between them about as broad as thickness of horn in the middle. 2

2(1) Temples swollen, not convergent just behind the eyes; females not known. 3

— Temples nearly rectilinear, moderately converging backwards. 4

3(2) First gastral tergite with 9—10 carinae, temples rounded posteriorly; Volosca in Istria Peninsula . . . . . *Dirhinus parotideus* Masi

— First tergite with more than 10 carinae, temples sharply edge-like bordered posteriorly; Israel . . . . . *Dirhinus* sp., near *parotideus* Masi

4(2) Anterior and dorsal (inner) edge of horn converging in acute to right angle, anterior and lateral edges forming acute angle of about 60°, the horn therefore considerably sharp; antennae and fore- and middle legs testaceous, feelers of female thick, last funicle joint at least twice broader than long; about 10 striae on first gastral tergite reaching only one third of length. Africa, South and East Asia, not recorded hitherto from the Mediterranean . . . . . *Dirhinus excavatus* Dalman

— Anterior and dorsal edges in right to obtuse angle, anterior and lateral edges in nearly right angle, the horn therefore rather obtuse; feelers of female often more slender; striae of first tergite reaching about $^2/_5$ of length. 5

5 (4) Inner wall of horn with vertical striae along front edge; feelers of female very thick, ring-joint subtransverse, first funicle joint slightly longer than broad, at most $1\ ^1/_3$ times longer than ring-joint, third funicle joint about $1\ ^1/_2$ times broader than long, flagellum (with pedicel) hardly as long as width of head; striae of first tergite slightly divergent, more than 10 in number;

legs and feelers almost entirely black; male not known; Central Asia, Cyprus . . . . . *Dirhinus gussakovskii* Nikolskaja

— Inner wall of horn without striae or carinae, only simply reticulate punctate; feelers of female much more slender, first funicle joint at least $1\,1/2$ times longer than ring-joint, third joint subquadrate, flagellum of female slightly longer than maximum width of head; males known. 6

6 (5) Striae of first tergite sparse and equally coarse, numbering 7—11, nearly uniformly parallel, the place occupied by them distinctly longer than broad; feelers and anterior four legs mostly testaceous; Israel, Cyprus, Albania . . . . . *Dirhinus cyprius* Masi

— Striae of first tergite dense, posteriorly shallower and finer than anteriorly, usually more than 10, slightly divergent, the place occupied by them at least posteriorly distinctly broader than long; feelers and legs usually mostly black, rarely more or less reddish; Central and Southern Europe, Algeria, Cyprus . . . . . *Dirhinus hesperidum* (Rossi)

Besides the species listed above one more might be included here, namely *Dirhinus vlasovi* Nikolskaja, from Turkestan. This species was very briefly described in a key with *D. hesperidum* (Rossi) and *D. gussakovskii* Nik. in: Chalcids of the Fauna of U.S.S.R. 1952, p. 86. Antennae of female still shorter than in *D. gussakovskii*, first funicle joint distinctly shorter than long, and inner walls of frontal horns simply reticulated, without striae, scape and anterior four legs red.

LEUCOSPIDIDAE

Leucospis dorsigera Fabricius

Turkey: Istanbul, 14.VIII (Bytinski-Salz).

Cyprus: Limassol; Cherkes; Yermasoyia River; Yermasoyia Hills; near Zakaki (Mavromoustakis).

Israel: Rosh Haniqra, 9.VII—12.IX; Jerusalem, 1.VIII (Bytinski-Salz).

Most specimens from Cyprus and Israel have pronotum yellow with transverse black band in the middle, shortened on the sides. Schletterer (1890) cites (Berl. ent. Z., **35**, 187, 192) *Leucospis turkestanica* Radoszkowski with a query as synonym to *L. dorsigera* F. (p. 187), and includes in this all specimens with richer yellow colouring from Anatolia. He considers evidently *L. turkestanica* Rad. to be only a variety of *L. dorsigera* F. Only recently Nikolskaja 1952 (Chalcids of the Fauna of U. S. S. R., p. 80) cites *L. turkestanica* Rad. correctly as a valid species. Specific characters of the two species are not in their colouring but in their morphology: ovipositor of *L. turkestanica* is shorter, it does not reach the basis of first tergite, hind femora are distinctly more slender and abdomen posteriorly broader than in *L. dorsigera*, more exactly: apical half of abdomen behind basis of fifth tergite is only by one quarter longer than its maximum width, while this part in *L. dorsigera* is by one half longer than broad.

Leucospis intermedia Illiger

Turkey: Salt Lake Karapinar, 6.VIII (Bytinski-Salz, Wahrman).

Cyprus: Moni; Zakaki; Limassol; Trimiklini; Fassouri; Pera Pedi (Mavromoustakis).

Israel: Rosh Haniqra, 9.VII; Kfar Ata, 8.VII; Beersheba, 23.VI; Jerusalem, I.V—23.VI; Haifa, 7.VII (Bytinski-Salz).

Species widely distributed in the Mediterranean region.

Leucospis gigas Fabricius

Israel: Jerusalem, 7.V (Bytinski-Salz, Houska); Wadi el-Kelt near Jericho, females with two males (Houska).

Antennae black or with reddish basal part of funicle, in one specimen flagellum entirely light red. This character was given by Mader 1936 (Ent. Z., **50,** 289, 290) for separating *L. grandis* Klug from *L. gigas* F., but it is of no specific value.

Leucospis gibba Klug

Israel: Tiberias, 12.VII.1945, one female (Bytinski-Salz); Wadi el-Kelt near Jericho, 25.X.1942 (Houska).

These specimens are morphologically identical with the female reported by me (1952) from Turkey (Acta ent. Mus. Nat.Pragae,**27,**47), but the yellow colouring is more extensive; it is richer still than in the type (after Schletterer's redescription, l.c., p.181—183). The Palestinian specimens have the following body parts yellow: scape, pedicel, basis of first funicle joint, pronotum except for transverse line on disk and narrow front margin, two longitudinal stripes on the sides of mesoscutum, scutellum without axillae, a spot on post-scutellum, another on mesopleura, whole metapleura, whole legs excluding basis of coxae and small black spots at teeth of hind femora, a broad saddle-like band on first tergite, narrow stripe on fourth tergite (second visible tergite), broad band on fifth tergite, a small spot on each side of sixth tergite, and dorso-caudal portion of epipygium. Bands of abdomen narrowly interrupted in median line. The specimen from Jericho bears two small rounded yellow spots on mesoscutum. Wings are somewhat less infuscate than in the Turkish specimen, subhyaline. The part of abdomen posteriorly from the hind margin of first tergite very distinctly inflated, so that these specimens cannot be considered to be *L. bifasciata* Klug, mentioned by Masi 1950 (Boll. Soc. ent. Ital., **79,** 91) from Palestine. The latter species is not known to me, except from the description.

Leucospis biguetina Jurine

Israel: Jerusalem, 15.V, one female (Bytinski-Salz).

Known as yet only from Southern Europe and Northern Africa (Morocco and Algeria).

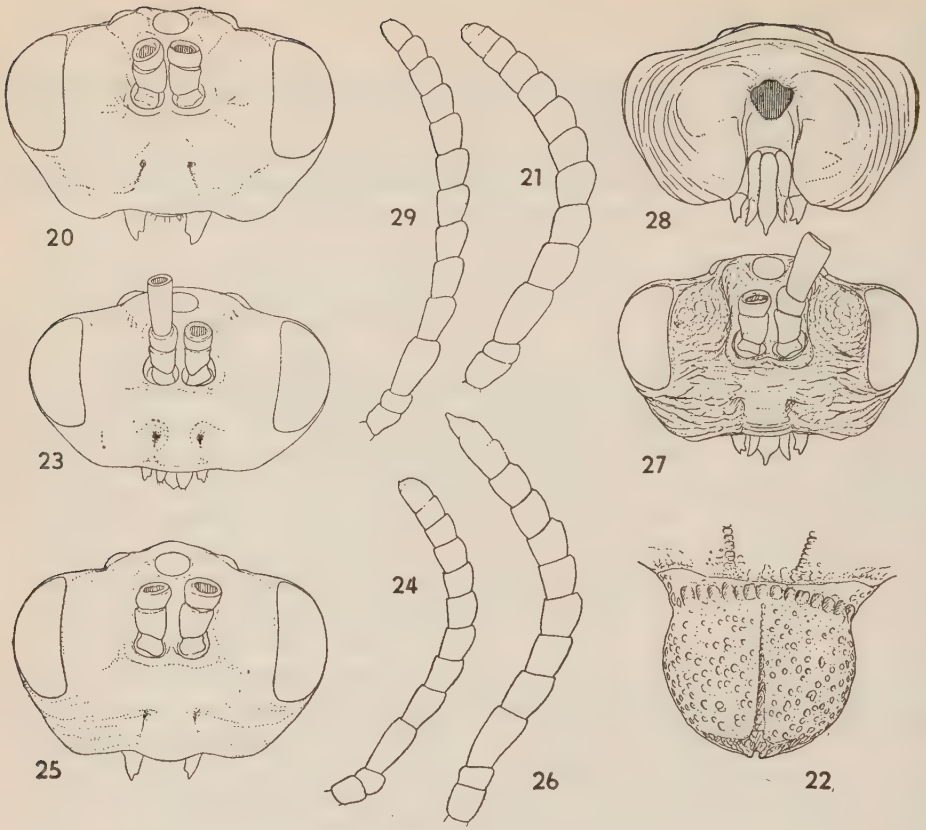
Hosts of *Leucospis* spp. are solitary bees, Apidae.

EUCHARITIDAE

Eucharis (**Pachyeucharis,** n. subg.)

Description of the new subgenus *Pachyeucharis:*

Head strongly transverse from in front, often much narrower than thorax, and usually transversely rugose. Antennae inserted somewhat above the middle of face, with 12—14 joints, not elbowed, simple, not distinctly serrate in females, not pectinate in males; scape very short, together with transverse pedicel shorter than first funicle joint. Mandibles not falcate as in other species of *Eucharis* Latr., but more rudimentary, very short and not bent, in all checked specimens of the subgenus hanging down,



Figures 20—29

(20) *Eucharis* (*Pachyeucharis* n. subg.) *microcephala* n. sp., head in facial view; (21) antenna of female; (22) scutellum. (23) *Eucharis* (*Pachyeucharis*) albipennis n. sp., head in facial view; (24) antenna of female. (25) *Eucharis* (*Pachyeucharis*) *affinis* n. sp., head in facial view; (26) antenna of female. (27) *Eucharis* (*Pachyeucharis*) *nigriventris* n. sp., head in facial view, and (28) in hind view; (29) antenna of female.

bidentate, probably not normally movable and unable to close, in such supposed position not crossing, hardly touching with their apices (Figures 27, 28).

Thorax strongly vaulted, globose or subglobose, very coarsely punctate, with mostly smooth and wide interspaces at least on disks of scapulae and on posterior part of middle lobe of mesoscutum. Notaulices finely foveolate, not deep. Scutellum usually shortly bilobed apically. Propodeum slightly vaulted, with rather deep spiracular furrows. Wings, legs and abdomen as in *Eucharis* s. str.

The new subgenus is very near to *Eucharis* Latr., s.str. (genotype: *Eucharis adscendens* (Fabr.)), from which it was separated on the basis of its small, straight mandibles, and very coarsely punctate and globose thorax.

The type of the new subgenus is *Eucharis punctata* Forster. Additional species belonging here are *Eucharis acuminata* Ruschka, of which I have seen the type, lent to me kindly by Dr. Beier from the "Naturhistorisches Museum" in Vienna, and *Eucharis*

anatolica Boucek, the type of which is in my collection in the National Museum in Praha, cat. no. 3071, and four new species from Israel, described below. Thus the subgenus is confined, as far as we know, to the Mediterranean region, i.e. Southern Europe, Asia Minor, Near East and North Africa.

Eucharis (*Pachyeucharis*) *punctata* Forster

Turkey: Konia, 8.VIII.1951, one female (Bytinski-Salz).

Previously known from Balkan Peninsula (Dalmatia, Macedonia), Asia Minor and Tunisia. Host *Messor barbarus* (L.).

Eucharis (*Pachyeucharis*) **microcephala**, n.sp.

Israel: Kfar Yeroham, 20.IV, one female, holotype (Bytinski-Salz).

Body generally dark metallic green, ventrally more bluish; mesoscutum along median line and along notaulices, then axillae and an arcuately transverse stripe on scapulae (here bordered with a violaceous tinge) with a more vivid, nearly bronze tinge; disks of scapulae subviolaceous to blackish. Abdomen of the holotype blackish, with a weak metallic tinge, coxae and femora concolorous. Apical ends of femora, tibiae and tarsi pale fulvous, short mandibles of the same colour. Feelers brownish black. Wings widely infuscate, more intensively beneath marginal vein, hyaline in basal two fifths.

Head much narrower than thorax (38 : 59), transverse (24 : 38), with rugulose sculpture everywhere. Frons between scrobe and eye roundedly vaulted, rugosely punctate. Tentorial pits deep, somewhat grooved vertically. Clypeus not separated from the supraclypeal area, both portions not polished, irregularly rugulose. Cheeks not strongly converging, rather buccate (Figure 20). Antennae shorter than width of thorax, 13-jointed, very slightly, indistinctly serrate (Figure 21), last two joints nearly fused. First funicle joint twice longer than broad, fifth as long as broad, the following less broad and shorter, slightly transverse, last (ninth) funicle joint broad 8, long 6; club ovate, by its half longer than preceding joint (9 : 7).

Thorax viewed from above only slightly longer than broad (69 : 59), with sparse and coarse punctation. The puncta somewhat closer on the sides and in front of scapulae, where the interspaces are as wide or nearly as wide as diameters of puncta. Notaulices formed by one row of small puncta. Median lobe of mesocutum along the middle with two non-punctate and subdepressed stripes, which meet on the disk before scutellum, in front between them an abbreviated longitudinal line of small puncta. Disks of scapulae nearly smooth. On smooth parts sparse and very small, microscopic puncta irregularly scattered. Scutellum with similar sculpture as mesoscutum, interspaces generally as wide as scattered coarse puncta. Median groove impressed, narrow, especially posteriorly very deep, ending in a narrow incision of the hind margin (Figure 22), crossed before the narrow lobes by a transverse deep furrow. Outline of scutellum strongly sinuate laterally, narrowed in front behind axillae, these very short, separated from scutellar disk by foveolate furrow, which is nearly straight and not much deeper between both axillae; these separated by a distance little smaller than the distance between scapulae posteriorly. Vertical sides of scutellum behind

axillae (i.e. axillulae) entirely smooth and polished. Propodeum very finely rugulose, almost mat. Upper margin of mesopleurae beneath prepectus highly polished, smooth, lower part separated by horizontal stripe of reticulated punctation.

Abdominal petiole twice longer than broad behind, slightly narrowed forward, subcarinate on median line, depressed along it in hind half; ventral surface very shallowly longitudinally grooved. Gastral tergites nearly smooth, with hardly distinct, very fine punctation.

Male not known, host ant probably *Cataglyphis bicolor* ssp. *nodus* Brllé, in the nest of which several *Eucharis* larvae were found (By.S. in litt.).

Differing from other species of the subgenus by the shape of antennae, buccate cheeks, sparsely punctate thorax with short scutellum, infuscate wings and black abdomen.

Eucharis (*Pachyeucharis*) **albipennis,** n. sp.

Israel: Kfar Yeroham, 5.VII, one female, holotype (Bytinski-Salz); Kurnub (Negev), 3.VI, females, paratypes (O. Theodor).

Very similar to *E. microcephala* Bck., differing by strongly converging cheeks, somewhat polished face, milky-whitish wings, striated sides of scutellum and mostly fulvous abdomen.

Female: 6.5 — 7 mm.

In colouring very similar to the preceding species, only dorsal surface of thorax more uniformly dark bluish green; wings whitish, not infuscate; legs pale testaceous, except coxae, which are concolorous with the body, femora below in the middle slightly infuscate. Abdominal petiole metallic, following segments fulvous, first tergite in one paratype on the sides and on base infuscate, and here with slight metallic tinge; in the holotype only base of first tergite and last segment infuscate.

Head viewed from in front much broader than high (35 : 21) and much narrower than thorax (35 : 49), its surface generally shallowly transversely striated; striae on frons rather rugose and better developed in its upper part where they run rather convergently towards anterior ocellus. Clypeus and supraclypeal area not separated and nearly smooth, polished, tentorial pits deeply dot-like. Cheeks strongly converging downwards (Figure 23). Feelers very similar to those in *E. microcephala*, the last but one joint somewhat more transverse (8 : 5), the sutures of club indistinct, feelers therefore more distinctly 12-jointed (Figure 24).

Thorax very similarly shaped and sculptured as in the preceding species, i.e. coarsely punctate with nearly smooth interspaces, these but somewhat smaller than diameters of dots, especially in front and on the sides of scapulae and on scutellum, as the coarse puncta are closer together. Middle lobe of mesoscutum with two smooth bands along the median line on the anterior sloping portion, median line not indicated by a row of puncta as in *E. microcephala*, but covered in a longitudinal stripe by fine, transversely rugulose sculpture. Scutellum somewhat longer and its sides more converging backwards, only slightly sinuate on the sides. Vertical sides of scutellum (axillulae) rather coarsely horizontally striated. Axillae very short, separated from scutellar disk by a foveolated furrow. Longitudinal furrow of scutellum as well as subapical cross groove not very

narrow, in one paratype quite shallow. Anterior upper portion of mesopleura separated horizontally by a foveolated furrow. Propodeum finely rugose, bottom shallowly granulated, weakly polished.

Abdominal petiole broad, not quite twice as long as broad apically (31 : 20), very shallowly concave along the median line dorsally, ventral surface distinctly but shallowly grooved longitudinally. Ovipositor on the conically narrowed point dorsally with five very fine, indistinctly saw-like teeth in a double row (ten denticles).

Male not known.

Eucharis (*Pachyeucharis*) **affinis,** n. sp.

Israel: Bat Yam, 29.IV, one female, holotype (Bytinski-Salz).

This species is very similar to the two preceding ones except for the shape of antennae, finer sculpture of face, slightly infuscate wings and longer abdominal petiole.

Female: 7 mm.

Head, thorax, abdominal petiole and coxae generally bluish green, disks of scapulae, front margin of mesoscutum and mesopleurae anteriorly with a more vivid, nearly bronze tinge. Flagellum black. Legs testaceous, coxae greenish black, femora infuscate in the middle. Wings slightly infuscate in distal two thirds. First gastral tergite dark bluish green, its hind margin as well as following tergites testaceous, sternites and tip of abdomen fuscous.

Head much narrower than thorax (36 : 59), transverse (36 : 25) viewed from in front (Figure 25). Cheeks and lower face transversely striated, clypeus nearly smooth, polished, not separated from the supraclypeal area. Upper face between scrobe and eye globosely vaulted, finely punctate, dorsally striated, striae converging towards the anterior ocellus. Depressed area between posterior ocellus and eye smooth. Occipital carina distinctly elevated behind anterior ocellus. Cheeks converging in angle of about 90°. Feelers 13-jointed (Figure 26), all flagellar joints elongate, seventh to twelfth segment subquadrate, last joint conically pointed.

Mesoscutum sparingly, coarsely punctate, disks of scapulae as well as disk of middle lobe nearly impunctate, with a few smaller dots only. Median line indicated in front by fine transverse striae, behind them by irregular puncta. Notaulices formed by finely foveolate lines, not deep, foveoles posteriorly in front of scutellum coarser, nearly as coarse as foveoles of axillar lines. Notaulices posteriorly separated by a distance hardly greater than maximum width of abdominal petiole. Scutellum shorter than broad behind axillae (27 : 33), its outline not sinuate; between axillae deep transverse furrow; median furrow complete, foveolate, posteriorly deeper, grooves separating apical lobes very deep, lobes very narrowly separated, roundedly pointed. Surface of scutellum covered with coarse dots separated by interspaces larger than diameters of dots. Axillulae with strong striae sloping backwards. Propodeum with very irregular network of fine and low carinae, nearly areolate, bottom not very shiny, subgranulate. Upper area of mesopleurae convex, smooth and polished, with a few microscopic puncta, horizontal furrow finely rugulose, lower part also nearly smooth. Abdominal

petiole more than twice longer than broad in the middle (20 : 9), sides of its hind half parallel, dorsal surface nearly flat, shallowly, irregularly and finely longitudinally rugulose. Ventral face without distinct groove. First gastral tergite with quite indistinct fine puncta in front of hind margin.

Male not known.

Eucharis (*Pachyeucharis*) **nigriventris,** n. sp.

Israel: Nahariya, 7.V, one female, holotype; Carmel (Haifa), 13.V.1944, one female, paratype (Bytinski-Salz).

This species by its relatively close punctation of thorax stands nearest to *E. punctata* Forst., from which it differs mainly by black gaster and more slender body with relatively broader head.

Female: 6.5 mm.

Bluish green, sides of thorax more violaceous, disks of scapulae, head above and abdomen dark green to blackish. Legs pale testaceous except infuscate femora and coxae, which are concolorous with the body. Wings subhyaline, slightly infuscate.

Head considerably narrower than thorax (35 : 47 or 35 : 49), but not so much as in *E. punctata* Forst., in which in four specimens these ratios are as follows: 37 : 58, 37 : 54, 36 : 54, 35 : 54; viewed from in front more transverse (21 : 35). Face including clypeus transversely rugosely striated (Figure 27), frons with quite coarse striae, radiating from the ocelli, also depressed area between posterior ocellus and eye transversely striated. Cheeks strongly converging. Feelers (Figure 29) 14-jointed, last two joints fused. Scape subquadrate, not so long as width of first funicle joint, which is almost twice as long as broad. Funicle joints slightly serrate, gradually becoming shorter, seventh to ninth joints subquadrate, tenth funicular joint very slightly transverse.

Thorax closely coarsely punctate, disks of scapulae to a small extent smooth, scapulae anterior to this area and laterally of it as well as two subdepressed stripes along the median line of middle lobe sparsely punctate, interspaces on the sides of scapulae above the prepectus about twice narrower than diameters of dots, just at margin of scapula about as wide as diameters. Puncta above tegulae very close, without interspaces. Notaulices foveolate, posteriorly rugulose-punctate. Scutellum nearly as long as broad behind axillae, with incomplete median longitudinal row of puncta, complete in paratype, apical lobes small, subtriangular as well as the incision between them. Propodeum shallowly reticulately rugulose, sides of thorax with similar sculpture, rather polished on convex portions, here nearly smooth in the holotype. Abdominal petiole broadened posteriorly, well twice longer than broad, depressed, with shallow transversely rugulose sculpture along median line, not grooved ventrally.

Male not known.

Key to the species of the subgenus *Pachyeucharis* Boucek:

1 Scutellum much longer than broad behind axillae, seen from the side much protruding over the propodeum, its dorsal and posterior wall in a sharp angle of about 55°; head only little narrower than thorax (36 : 47); wings whitish; feelers of male with 14 well separated joints; female not known; Anatolia. . . . . *E.* (*P.*) *anatolica* Boucek 1952

— Scutellum shorter than broad behind axillae, from the side little protruding above the propodeum, its dorsal and posterior side in acute angle; head by more than one half narrower than thorax; feelers of male in two species (males of others not known) with 13 separated joints; females known 2

2(1) Scutellum with two broadly rounded apical lobes, separated by an incision which is as broad as each of both lobes, each lobe longer than broad; sides of scutellum rugose; thorax closely punctate; wings whitish, abdomen of male black, female not known; Transcaucasia . . . . . *E.* (*P.*) *acuminata* Ruschka 1924

— Scutellum with shorter and more or less narrowly separated, triangular lobes; other characters dissimilar 3

3(2) Wings whitish, abdomen mostly fulvous, vertical sides of scutellum behind axillae striated; Israel . . . . . *E.* (*P.*) *albipennis* Boucek, n. sp.

— Wings more or less but always distinctly infuscate or yellowish apically. 4

4(3) Vertical sides of scutellum behind axillae smooth; abdomen black; wings rather strongly infuscate; thorax sparsely punctate; cheeks buccate, slightly converging; penultimate antennal joints slightly transverse, last joint rounded; Israel . . . *E.* (*P.*) *microcephala* Boucek, n.sp.

— Vertical sides of scutellum behind axillae striated or horizontally rugulose or abdomen mostly fulvous; penultimate antennal joints subquadrate. 5

5(4) Abdomen black; thorax rather densely punctate; Israel . . . . . *E.* (*P.*) *nigriventris* Boucek, n. sp.

— Abdomen mostly fulvous. 6

6(5) Last antennal joint conically pointed; thorax sparsely punctate; face rather polished, frons laterally finely punctate; Israel . . . . . *E.* (*P.*) *affinis* Boucek, n. sp.

— Last antennal joint obtuse; thorax densely punctate; face transversely rugulose, only slightly polished; cheeks more converging; Southern Europe, Anatolia, Tunisia. . . . . *E.* (*P.*) *punctata* Forster 1859

Eucharis (subg. **Eucharisca,** n. n.) **bytinski-salzi, n.** sp.

Israel: Bat Yam, 15.V, 4.VI (holotype), and 11.VI, five females; Ramat Gan, 1.VI and 8.VI, 2 females; Urim, 15.V, one female; Beersheba, 20.IV, one female (paratypes); Meged, 6.IX.1948, one male (allotype), all specimens collected by Bytinski-Salz.

This species is near to *Eucharis bedeli* (Cameron) of which I was able to reexamine the types kindly lent to me by Dr. Beier of the Vienna Museum. *E. bedeli* has differently shaped antennae (depicted by Ruschka, Dtsch. ent. Z., 1924, **87,** figs. 6, 7), as well as finer sculpture of thorax; its mesoscutum is not densely punctate along notaulices. The latter species was described by Cameron as *Chalcura bedeli*, but also according to Ruschka (l.c., p.88) it differs greatly from the genotype of *Chalcura* Kirby, which is *Eucharis deprivata* Walker from Ceylon. Therefore *Chalcura* Cameron not Kirby was synonymized by Ruschka with *Eucharis* Latreille. Gussakovskij 1941 (Trav. Inst. zool. Acad. Sci. U.R.S.S., **6,** 155) considers species of *Eucharis* with ramose antennae in males to be a good subgenus and replaces (1951) *Chalcura* Cameron 1891 nec Kirby 1886 with *Chalcurella*, n.n. This name is, however, preoccupied by *Chalcurella* Girault 1913 (Trans. roy. Soc. S. Aust., **37**, 94, in Eucharitidae), and as I, too, consider this subgenus valid taxonomically, I change its name to *Eucharisca*, new name for *Chalcura* Cameron not Kirby, and for *Chalcurella* Gussakovskij, not Girault. Apart from antennae, this subgenus differs from *Eucharis* s. str. by broadened prepectus. The mandibles are falcate as in *Eucharis* s. str. The type of the subgenus *Eucharisca* Boucek is *Chalcura*

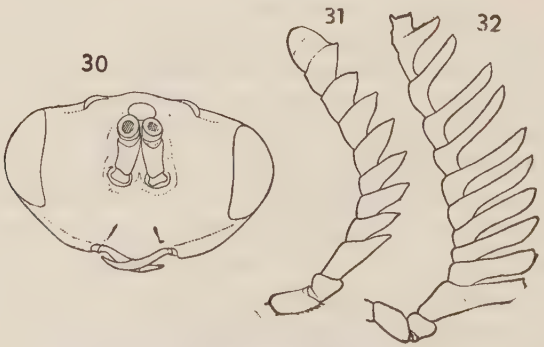
bedeli Cameron 1891, other species belonging here are *E. intermedia* Ruschka 1924, *E. schmiedeknechti* Ruschka 1924, *E. hyalipennis* Hoffer et Novitzky 1955 and *E. bytinski-salzi*, n. sp. The subgenus *Eucharisca* Bck. is confined, as far as known, to the Mediterranean region.

Description of *Eucharis* (*Eucharisca*) *bytinski-salzi*, n. sp.:

Female: 4.5 — 5.5 mm.

Body dark metallic green, mesopleurae somewhat bluish, coxae, abdominal petiole and first gastral tergite anteriorly concolorous, other gastral segments fulvous to partly fuscous; legs pale testaceous, femora infuscate; antennae brownish black, club and scape with pedicel testaceous. Wings whitish hyaline, venation whitish except the base of submarginal vein which is pale testaceous similarly to tibiae and tarsi.

Head distinctly narrower than thorax (33 : 43), viewed from in front considerably transverse (21 : 33), cheeks strongly roundedly convergent (Figure 30). Upper face finely rugulosely punctate, frons between eye and scrobe flat, puncta here lengthened vertically and somewhat rugulose but not much crowded, in lower part becoming gradually smoother, lower face nearly smooth and polished, its sides and cheeks with sparse and shallow stria from eye to mouth, temples similarly striated. Clypeus slightly semicircularly protruding, not separated from the supraclypeal area, smooth and highly polished. Tentorial pits large, their bottom nearly smooth. Space between posterior ocellus and eye subdepressed, polished, nearly twice larger than the transverse diameter of the ocellus. Occiput bordered in the middle by sharp margin which is obtuse behind eyes. Antennae elbowed but scape short, cylindrical, only twice longer than broad, oblique at apex. Pedicel triangularly pear-shaped, dorsally hardly as long as broad apically, seen from the side. Flagellum very distinctly serrate, each of seven funicular joints with a short branch (Figure 31), first joint below twice longer than broad basally, and twice shorter than long dorsally, the branch acute; each following joint about twice shorter, their branches about twice longer than the lengths of corresponding joints, seen from above conically pointed. Club fused of three segments, the two apical ones nearly completely, with indistinct suture, the basal joint forming a pointed tooth dorsally; length of club twice the width of its middle joint.



Figures 30—32

Eucharis (subg. *Eucharisca* n.n.) *bytinski-salzi* n. sp. (30) head of female in facial view; (31) antenna of female; (32) antenna of male.

Thorax strongly vaulted, from above only little longer than broad (46 : 43). Notaulices complete, grooved posteriorly and at end separated by a distance four times smaller than scutellum behind axillae. Neighbourhood of notaulices crowdedly but very finely punctate in a stripe which is confined in front only to the inner side of the furrow; scapulae anteriorly and on the sides rugulosely punctate, disks in an elongated area polished, smooth. Middle lobe of mesoscutum in front finely transversely striated, in the middle smooth but along median line with more or less sparse punctation. Scutellum slightly longer than broad behind axillae (47 : 44), axillae not distinctly separated one from the other, axillar furrows, however, deep, rugosely foveate, median furrow of scutellum coarsely rugose, rather deep, irregular, ending posteriorly in a strongly rugose sculpture with elevated areolae in front of the more or less shortly bilobed apex. Surface of scutellum punctate to rugosely punctate. Hind wall of scutellum vertical, areolated. Propodeum nearly smooth and polished, only basally and in the neighbourhood of petiole somewhat rugose. Abdominal petiole $1\frac{1}{2}$ times longer than broad, front third narrowed and on the sides deeply depressed, along the median line only somewhat elevated, posteriorly slightly depressed.

Male: 4.5 mm.

In colouring similar to the female but antennae and abdomen blackish. Antennae strongly branched (Figure 32), with ten branches, eleventh branched joint fused with two following segments into a cornuted club. Sculpture of body stronger and punctation more rugulose than in female. Propodeum rugose. Abdominal petiole slender, sides subparallel, nearly three times longer than broad in the middle.

Named in honour of Dr. H. Bytinski-Salz of Tel Aviv, who recognized this species as new.

Eucharis (*Eucharisca*) *intermedia* Ruschka

Israel: Karkur, 10.VII.1946, one female (Bytinski-Salz).

This specimen agrees very well with Ruschka's description. It is very near to the preceding species and to *E. bedeli* (Cam.), from which it differs mainly by the coarser and more rugulose sculpture on the punctate portions of thorax, and by differently shaped antennae.

Stilbula vitripennis Masi

Israel: Haifa (Carmel), 7.VII.1946, one male (Bytinski-Salz).

The species was reported so far only from Asia Minor and Cyprus.

FISHES FROM CYPRUS, IRAN, IRAQ, ISRAEL AND OMAN

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ABSTRACT

Of the 56 species reported in this paper 28 are from Eilat, Red Sea. Of these, 19 species are first records from this locality, 4 species are new: *Dunckerocampus* **ben-tuviae** (Syngnathidae), *Thalassoma* **klunzingeri** (Labridae), *Scorpaena* **aqabae** (Scorpaenidae), *Carapus* **variegatus** (Carapidae). 2 more fishes are from the coast of Oman and one from that of Iraq. 19 species are put on record from the Mediterranean coastal waters (Cyprus, Israel, Turkey), of these two are new: *Callionymus* **haifae** (Callionymidae) and *Stephanolepis* **weberi** (Monacanthidae) both from Israel, while five others are mentioned for the first time as immigrants from the Red Sea: *Sardinella sirm* (Wahlbaum) (Clupeidae), *Hyporamphus xanthopterus* (Val.) (Hemiramphidae), *Danichthys unicolor* (Val.) (Exocoetidae), *Epinephelus morrhua* (Val.) (Serranidae), *Upeneus vittatus* (Forsk.) (Mullidae). Of the 6 freshwater fishes two new ones are Cyprinidae from Iran: *Schizothorax* **schumacheri** and *Oreinus* **anjac**; two species are from Iraq, one is from Israel, and one is a new Cyprinid fish from Oran, *Garra* **barreimiae**.

The fishes reported in this paper were sent to Philadelphia from various collections. The major part was forwarded by the Department of Zoology of the Hebrew University of Jerusalem, Israel, in 1950 and 1951, and was received at the Academy of Natural Sciences of Philadelphia during that interval. As the fishes contained in these shipments belonged in part to the Hebrew University of Jerusalem and in part to the Israel Sea Fisheries Research Station, Haifa, they are recorded in this paper with the original collection number of the respective institutions, amended by either the letters HU or SFRS. Several specimens of this group had already been reported elsewhere (Ben-Tuvia and Steinitz 1952, Steinitz 1952). However, on studying the collections anew it seemed desirable to amplify the record for reasons stated in the proper place; in other cases only the generic or even the family name had been published, the specific name being added in this paper; finally, there had been a number of misidentifications which could be corrected in the course of this work. Fish specimens already recorded in any of the publications mentioned are indicated in the present paper by an asterisk.

Another lot of fishes was obtained directly from the Israel Sea Fisheries Research Station in Haifa and transmitted by Mr. A. Ben-Tuvia. Fishes from this source are indicated in this report by the letters SFRS and quoted with the original collection

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number, as far as available. Mr. Ben-Tuvia also contributed interesting and valuable field notes which were used extensively in the preparation of this paper, and several of them are quoted herein.

Two mountain barbels (*Schizothorax* and *Oreinus*), interesting and rare specimens from eastern Iran, were presented to the Academy by Mr. Paul J. F. Schumacher, who has also kindly furnished us with an interesting account of the Sayyad fishermen in the locality where the mountain barbels were obtained.

Several fishes collected in Iraq and representing two different species were given to the Academy by Professor N. A. Weber.

Since the migration of fishes through the Suez Canal appears to go on steadily, and Red Sea species are being collected in increasing numbers from Mediterranean localities, it seemed advisable to indicate unequivocally the localities of all marine fishes reported here. This has been done by adding the letters MS to Mediterraenan, the letters RS to Erythrean localities.

Of the 56 species listed in this paper the following appear to be new:

Garra barreimiae
Schizothorax schumacheri
Oreinus anjac
Dunckerocampus ben-tuviae
Thalassoma klunzingeri
Scorpaena aqabae
Callionymus haifae
Carapus variegatus
Stephanolepis weberi

We have proposed a new generic name for a species of Platycephalidae (i.e. *Papilloculiceps*). The genotype for this proposal is a known Indian Ocean species, and is also recorded herein for the first time for the Red Sea. A number of other species in the collections are published as first records for the Red Sea, while still others are little known or rare species.

The type specimens of the new species described have all been generously donated by the Hebrew University and the Israel Sea Fisheries Research Station to the Academy of Natural Sciences of Philadelphia. The first set of duplicates, including the first paratypes, is retained in the respective Israel institutions. The accompanying figures were all prepared by the senior author.

DUSSUMIERIIDAE

1. *Etrumeus micropus* (Schlegel)

One 58 mm. Eilat, RS, Israel. 1949. A. Ben-Tuvia. SFRS: No. A 42/a.
One 156 mm. Eilat, RS, Israel. A. Ben-Tuvia. SFRS: No. A 339.

2. *Dussumieria acuta* Valenciennes

Five 35 to 54 mm. Ascalon, MS, Israel. 27.VII.1947. H. Lissner. HU: No. 1672. All show rather large scales which, though most have fallen, approach 40 in a lateral count.

Two 16 to 24 mm. Ascalon, MS, Israel. 27.VII.1947. H. Lissner. HU: No. 1673.

An Indo-Pacific species which entered the Mediterranean Sea, but has not been hitherto reported from the Red Sea.

*3. *Spratelloides delicatulus* (Bennett)

Five 47 to 54 mm. Eilat, RS, Israel. 9.X.1949. A. Ben-Tuvia. SFRS: No. A 340.

* Four 18 to 20 mm. Eilat, RS, Israel. 24.IV.1951. H. Steinitz. HU: No. 2069. (Mentioned as *Stolephorus* sp. in Ben-Tuvia and Steinitz, 1952, p. 4).

The brilliant silvery lateral band is now grey black, though the eye is silvery and in some specimens with a grey suffusion above.

CLUPEIDAE

4. *Sardinella sirm* (Walbaum)

Clupea sirm Walbaum, Artedi Pisc., vol. 3, 1792, p. 17 (on Forskael, Descript. Animal., 1775, p. 17, Arabia).

Four 65 to 74 mm. 'Atlit, MS, Israel. 10.IV.1950. G. Haas. HU: No. 2014. Largely bright silvery white. Back drab above level of eye. Fins whitish. Maxillary reaches opposite front edge of eye. Compared with Rueppell's figure (*Clupea sirm* Rueppell, Neue Wirbelth., Fische, 1835, pl. 21, fig.), the maxillary is shown as falling well short of the eye.

ENGRAULIDAE

5. *Amentum commersonii* (Lacepède)

One 60 mm. Arabia (Oman?). I.1944. D. Vesey-Fitzgerald. HU: No. 2087. Apparently discoloured, only head and fins pale. Eye grey black. Silvery lateral band darkened.

Previously reported as *Engraulis commersonianus* by Boulenger (P. Z. S. London, 1887, p. 666) from Muscat.

6. *Thrissocles baelama* (Forskael)

Six 57 to 68 mm. Batinah coast, Oman, Indian Ocean. 22.I.1944. D. Vesey-Fitzgerald. HU: No. 2086. Caught in large quantities and called "Barija". No scutes on breast.

Six 50 to 60 mm. Arabia (Oman?). I.1944. D. Vesey-Fitzgerald. HU: No. 2087.

CYPRINIDAE

Garrinae

7. *Garra* **barreimiae** n. sp. Figures (1) type in lateral view, (2) scale from lateral predorsal, (3) front aspect of head, (4) head from below.

Depth 4 $^{2}/_{3}$ to 4 $^{4}/_{5}$; head 3 $^{2}/_{5}$ to 3 $^{3}/_{5}$, width 1 $^{2}/_{5}$ to 1 $^{1}/_{2}$ in its length. Broad snout convex, length 2 $^{1}/_{2}$ to 3 in head, tip in front level with lower edge of eye; small eye

well elevated, close to upper profile of head, diameter 3 3/4 to 4 7/8 in head, 1 2/5 to 2 in interorbital; upper lip with hind edge entire; mental disk with free edge entire all around, its surface smooth; rostral barbels nearly equal eye, right maxillary one short and left one may be absent; top of snout with slight crescentic groove or depression; front nostril with slight cutaneous rim, folds behind over hind nostril situated close behind; narrow suborbitals little distinct; interorbital width 2 2/5 to 3 in head, level or nearly flat. Gill opening restricted, lateral. Right pharyngeal teeth 5,3,2, compressed ends with slight grinding surfaces.

Scales 32 + 2 in lateral line, which is distinct and of simple tubes; 4 scales above to dorsal origin, 3 below to ventral origin; 12 predorsal; largest scales on sides of trunk; basal caudal scales not especially enlarged.

D. III, 7, third simple ray 1 1/5 to 1 1/4 in head; A. III, 5, inserted well behind tip of depressed dorsal; caudal well emarginated, lower lobe 3 to 3 3/5 in rest of fish; pectoral I, 15, fin 1 1/5 to 1 1/3 in head; ventral I, 7, fin 1 1/4 to 1 1/3; vent an eye diameter before anal fin.

In alcohol rather dark brown, trunk and tail scarcely paler below. As all scale pockets, on trunk and tail, are darker than general colour, they appear as obscured dark reticulations. Rather obscure rounded dark spot behind eye. First scale of lateral line as large black blotch. Obscure dark cloudings on trunk and tail variable. Under surface of head, chest and bases of pectorals pale brown. Fins drab, rays dark grey folded fins showing dark grey to blackish areas. Iris slate.

No. 72129 A.N.S.P. Barreimi, Oman. 1.III.1944. D. Vesey-Fitzgerald. HU: No. 2085/1. Length 62 mm. Holotype. Five 38 to 52 mm. Nos. 72130 to 72134 A.N.S.P. (HU: No. 2085/2-6). Same data as holotype. Paratypes. In the smaller specimens all 4 barbels are present and the dark markings are more distinct and contrasted. The 2 dark spots behind and level with the eye are present in all.

As several species of *Garra* are involved, more or less, with those we are describing herein, a few comments appear necessary.

Garra arabica Hora (Rec. Indian Mus., vol. 22, pt. 5, no. 69, Dec. 1921, p. 678, text-fig. 5; Lahej near Aden) is described as a "fairly stout fish with the dorsal profile arched and the ventral almost horizontal and straight in front of the anal fin". This distinction separates it trenchantly from both of the species we are describing. In addition our 2 tuberculated species have a very different arrangement of tubercles on the snout.

Garra tibanica Trewavas (British Museum (Natural History) Expedition to Southwest Arabia 1937-8, vol. 1, nos. 1-8, Feb. 22, 1941, p. 8, figs. A-B; Yemen, Usaifira; Wadi Tiban, northwest of Jebel Jihaf, 3700 feet). Also *Garra brittoni* Trewavas (l.c., p. 11, figs. A-B; Nigyal al Alap, a cistern 8 miles south of San'a, nearly 8000 feet, Yemen). Both this and *Garra tibanica* are figured without a modified axillary scaly flap basal to the ventral fin, moreover their scalation, mouthparts and coloration are quite different. The tuberculate snout of *G. tibanica* as shown on the figure is very different from either of our 2 species bearing tubercles. It is also shown with the inner bases, or axillary part of the pectoral, blackish, a character not found in any specimens we have seen.

(Named for the type locality Barreimi).

8. *Garra rufus* (Heckel). Figures (5) lateral view, (6) scale from lateral predorsal, (7) head from below; all of No. 72135 A.N.S.P., from Ma'ayan Ro'im.

Depth 4 1/5; head 4 2/3, width 1 1/7. Snout 2 1/4 in head, tip in front below level of eye; eye small, well elevated, 6 in head, 2 1/3 in interorbital; upper lip with edge entire, surface smooth; mental disk, with edge entire, free all around, surface smooth; long barbels distinct, equal or slightly longer than eye; on top of muzzle obscure and slightly crescentic transverse groove about first fourth in snout length; front nostril with simple cutaneous flap, largely concealing hind nostril which is close behind; suborbitals narrow; interorbital width 1 7/8 in head. Gill opening restricted, lateral. Right pharyngeal teeth 5,4,2, slender, ends hooked and with broad entire grinding surfaces.

Scales 31 + 3 in lateral line, which is only distinct or with well developed tubes till opposite dorsal insertion; 4 scales above to dorsal origin, 4 below to ventral origin; 12 predorsal; scales largest on side of trunk medianly, smaller on tail. Scales on caudal base moderate.

D. III, 7, longest ray slightly greater than head; A. III, 6, inserted well behind depressed dorsal tip; caudal moderately emarginate, lower lobe 3 1/2 in rest of fish; pectoral long as head, rays I, 13; ventral much less than dorsal fin height, 1 1/4 in head, rays I, 7.

Colour in alcohol dull brown, blotched and marked diffusely with darker brown and more or less ill defined obscure lateral band along lateral line. Iris grey. Small dark round spot at beginning of lateral line. Under surface of body and lower fins all lighter or pale brown. Dorsal with dark to blackish bar at bases of second to sixth rays. Dorsal and caudal dull grey brown.

No. 72135 A.N.S.P. Ma'ayan Ro'im, Bet Shean Valley, Israel. 22.III.1950. H. Steinitz. HU: No. 989/2. Length 114 mm.

Differs from the preceding species in having the front pupil edge slightly more advanced, a much smaller head, smaller mental disk, longer barbels, anal insertion more remote from end of depressed dorsal and with quite different coloration.

Figures (8) lateral view, (9) scale from lateral predorsal, (10) front aspect of head, (11) head from below; all of No. 72136 A.N.S.P., from 'Ain Umm Keishiq.

Depth 4 1/4; head 4, width 1 2/5. Snout 2 1/8 in head, front tip below level of eye; small eye well elevated, 6 1/5 in head, 3 in interorbital; upper lip with feeble plicated edge; mental disk with entire edge, well free all around, surface smooth; short barbels both less than eye diameter; top of snout with crescentic transverse groove near first 2/5 in snout length; front nostril with simple cutaneous expanded flap behind, covering hind nostril; suborbitals narrow; interorbital width 2 in head. Gill opening restricted. Right pharyngeal teeth 5,3,2, compressed and narrow ends with minute terminal hooks.

Scales 32 + 3 in lateral line, tubes obscure; 4 scales above to dorsal origin, 3 below to ventral origin; 13 predorsal; scales largest on trunk, reduced on tail and on caudal peduncle; several basal caudal scales enlarged.

D. III, 7, longest ray slightly less than head; A. III, 6, inserted closely behind tip of depressed dorsal; caudal well emarginate, lower lobe 3 3/5 in rest of fish; pectoral 1 1/4 in head, rays I, 13; ventral little less than dorsal fin height, rays I, 7.

Colour in alcohol grey or rather dark drab brown on back and upper sides, on both head and body down nearly to level of pectoral origin. Short dark grey obscured vertical bar at beginning of lateral line close behind gill opening. On head tubercles of snout pale or light brown, and like rest of under surface of head and cheeher to body. Iris drab. Fins all pale brownish with median caudal rays dark brown. Median dorsal rays with

grey black basal streak, but not extended on back. Upper caudal lobe with a few dark grey spots. Inner terminal surfaces of pectorals slightly more brownish than outer.

No. 72136 A.N.S.P. 'Ain Umm Keishiq, Bet Shean Valley, Israel. 22.III.1950. H. Steinitz. HU: No. 987/3. Length 91 mm.

According to the synopsis of African species of *Discognathus* given by Boulenger in 1909, this one would enter his first section or I, having the pupil in the second half of the head, though the barbels are but little less than the eye. The 2 species he includes in this section are *D. dembeensis* (Rueppell) from the upper Blue Nile, the Owo River and Kilimanjaro, and *D. johnstonii* Boulenger, from Lake Victoria and Kilimanjaro. Both are shown and described with characters and details unlike those of our specimen (72136), which differs from both sharply in the structure of its snout with a transverse groove and the pattern of tubercles.

Cyprininae

9. *Schizothorax* **schumacheri** n. sp. Figures (12) type in lateral view, (13) head from below, (14) large postscapular scale, (15) small upper lateral predorsal scale, (16) preanal scale. Mawda.

Depth 4; head $3\,1/2$, width half its length. Snout 3 in head measured from upper jaw tip, latter in profile about level with lower edge of eye; eye 8, $2\,1/2$ in snout, $2\,2/5$ in interorbital; edge of eye surrounded by rather wide adipose area, though lids free all around; maxillary reaches little beyond hind nostril, but not quite opposite front edge of eye; mouth moderately inclined, with closed jaws, lower slightly projecting, upper well protractile or protrusible forward; lips thin, entire: barbels 4, long, slender, anterior pair slightly shorter, and posterior pair at least twice length of eye; sulcus of maxillary deep; lower lip continuous across broad symphysis of mandible; preorbital long as 2 eye diameters, and suborbitals narrow; nostrils rounded, entire, close-set, anterior with cutaneous edge broadening behind and posterior nostril slightly larger; interorbital broadly convex. Gill opening extends forward about midway in length of head. Gill rakers small, short, 7 + 15, of which several on ceratobranchial are more or less rudimentary. Pharyngeal teeth 2,3,5 + 5,3,2, hooked, terminally each with little concavity longitudinally on inner face; pharyngeal bones rather slender.

Tubular scales about 100 + 6 in lateral line, tubes all small and simple; 60 predorsal scales; 27 scales between dorsal origin and lateral line, 24 between lateral line and ventral origin, 21 between lateral line and anal origin. No scales on head or prepectoral region, though they occur on the breast well forward, at least until opposite hind preopercle edge. Of fins, scales only present on caudal base. Behind shoulder girdle scales little larger than elsewhere, as they show a great uniformity in their small or minute size; along the sides of the body they form into more or less regular longitudinal series, though these are not entirely even rows. Some of the scales bordering the vent laterally are vertically a little enlarged and form a sheath extending back above front of anal.

D. III, 8, third simple ray enlarged, bony, and its hind edge with 24 antrorse barbs, which are longest subterminally with the end of this ray flexible; A. III, 5, small. Caudal forked. Least depth of caudal peduncle 3 in total head length. Pectoral rays I, 17, fin length $1\,3/4$ in total head length. Ventral rays I, 9, spine flexible terminally, fin length $2\,1/10$ in total head length.

Colour when fresh in alcohol with back greyish, sides and under surface whitish, whole body overshot with bright shining silvery white reflections. Iris brilliant silvery white. Fins all pale, dorsal and caudal diffused with pale olive buff, others more or less whitish. On membrane of dorsal a narrow transparent streak, parallel and close before each ray.

No. 71950 A.N.S.P. Zabol, Eastern Iran. IX.1949. Paul J. F. Schumacher. Length 244 mm. Type.

No. 71951 A.N.S.P. Same data as type. Length 130 mm to ends of broken caudal. Paratype. It shows the following:

Depth 4 1/3; head 3 2/5, width 2 1/4 in its length. Snout 3 1/3 in head; eye 6, 2 in snout, 1 1/2 in interorbital; maxillary reaches opposite hind nostril; closed mouth with lower jaw slightly included; mouth well protrusible; thin lips entire, lower continuous across mandible; slender barbels 4, all at least slightly longer than eye and posterior longer; preorbital long as eye; suborbitals narrow; interorbital 4 in head.

Scales 95 + 10 in lateral line; 65 predorsal scales; 25 scales between dorsal origin and lateral line; 24 between lateral line and anal origin. Some of scales enlarged behind shoulder girdle.

D. IV, 8, hind edge of fourth osseus ray with 25 antrorse barbs, but end of spine apparently rigid and stiff; A. III, 5, third ray flexible; pectoral rays I, 14; ventral rays I, 9.

Colour in alcohol pale grey brown above, sides and lower surfaces brilliant silvery white. Iris bright silvery white. Fins more or less greyish, lower ones whitish.

These specimens are remarkable for the oily nature of their bodies. Many globules of oil were precipitated in the alcohol in the jars in which these specimens were contained when first received. It was found necessary to change the alcohol several times afterwards.

S. schumacheri is apparently related to *S. intermedius* M'Clelland* and as interpreted by Herzenstein**. It differs, however, in the facies of the head, due largely to the prominent and protruding mandible in the closed mouth, the very long postocular expanse of the head, insertion of the ventral fin slightly behind the dorsal origin, larger dorsal fin, and apparent naked prepectoral region. From the imperfect and brief account given by M'Clelland it is hardly possible to identify his description with *S. schumacheri.*

S. poelzami Kessler has been reported from eastern Persia, at Dschenk and the Marisch River, by Nikolski***. He also describes a closely related genus *Apiostoma*, stating it is close to "*Aspiorrhyncho*" Kessler, but with 4 barbels, different shorter head, maxillary scarcely exceeding the mandible, and the mouth semisuperior. These details would hardly distinguish it from *Schizothorax*. The scales between the lateral line are evidently to be construed as 13, quite in contrast to the 24 found in *S. schumacheri.*

Guenther**** places *Barbus microlepis* Keyserling 1861 in *Schizothorax*, ignoring or overlooking the fact it is preoccupied by *B. microlepis* Bleeker 1850. He gives D. 12, lateral line 108 scales, body depth less than head which is 4, and produced snout with upper jaw longer than lower. River near Anardareh, between Herat and Lasch. He also follows with reference to the imperfectly described *B. miliaris* Filippi 1865, from

Calcutta Journ. Nat. Hist., vol. 2, 1842, p. 579. Cabul R. at Jullalabad: Tarnuck R., Afghanistan.

**Wiss. Result. Przewalski Cent. Asien*, Zool., Band 3, Abt. 2, Fische, 1889, p. 106, pl. 9, fig. 2, pl. 10, fig., pl. 14. fig. 1.

***Annuaire Mus. Zool. Ac. St. Petersbourg*, vol. 2, 1897, p. 345.

****Cat. Fishes Brit. Mus.*, vol. 7, 1868, p. 169.

Teheran, giving the lateral line 92, and the dorsal origin somewhat more backward, or above the root of the ventrals.

(Named for Mr. Paul J. F. Schumacher.)

10. *Oreinus* **anjac** n. sp. Figures (17) type in lateral view, (18) head from below, (19) large postscapular scale, (20) small upper lateral predorsal scale, (21) preanal scale. Anjaq.

Depth 4 $^{2}/_{5}$; head 4 $^{4}/_{5}$, width 1 $^{1}/_{5}$ in its length. Snout 3 in head, its tip slightly below level of lower eyelid; eye 7, surrounded by wide adipose area, with lids free all around; maxillary reaches opposite internasal frenum; mouth inferior, subhorizontal, jaws but little protractile; lips broad, rather thick, smooth, lower wider than upper and with a broad posterior finely papillate area, forming a continuous fold over mandible border; barbels 4, anterior pair slightly longer or equal to 2 eye diameters; maxillary sulcus deep pit; preorbital long as 1 $^{1}/_{2}$ eye diameters and suborbitals moderate; nostrils rounded, entire, close-set, anterior with cutaneous edge broadening behind and posterior nostril slightly larger; interorbital broadly convex, its width 2 $^{1}/_{2}$ in head. Gill opening extends forward about last third in head. Gill rakers 8 + 25, small, short, flexible points. Pharyngeal teeth 2,3,5 + 5,3,2, with small terminal hooks and smaller teeth with broad flattened terminal grinding surfaces.

Tubular scales 102 + 8 in lateral line, tubes small and simple; 60 predorsal scales; 32 scales between dorsal origin and lateral line; 25 scales between ventral origin and lateral line. Scales behind shoulder girdle and along each side of vent a little enlarged. Over body scales all uniformly small and disposed in more or less longitudinal rows, all of which are not strictly parallel or even. Chest, breast and belly entirely scaled. Of fins, caudal base alone with scales.

D. III, 8, third simple ray spine-like, enlarged, bony and its hind edge with 26 antrorse denticles which are largest subterminally and end of spine flexible. A. III, 5, simple rays more or less bony basally and subbasally, also entire. Least depth of caudal peduncle 2 in head. Pectoral 1 $^{1}/_{6}$, rays I, 20; ventral 1 $^{1}/_{3}$, rays I, 9.

Colour when fresh in alcohol with back and upper surfaces dull grey, with 3 or 4 obscure suffusions of darker grey on predorsal and others on postdorsal region. Sides and lower surfaces of body brilliant shining silvery white. A yellowish buff tinge extends from the upper scapular arch along the lateral line till below the dorsal. Preorbital and blotch behind end of maxillary orange. Dorsal and caudal pale yellowish brown, upper border of former and hind borders of caudal lobes more or less dark grey. Lower fins whitish with orange suffusion on pectoral above and deeper area on front median region of ventral.

No. 71949 A.N.S.P. Zabol, Eastern Iran. IX.1949. Paul J. F. Schumacher. Length 181 mm. Type.

Only the type was obtained. It is probably related to *Schizothorax sinuatus* Heckel*, based on a specimen 200 mm long. It agrees somewhat in having the hind border of the lower lip papillate, but differs trenchantly in having larger scales. In the lateral line about 112 tubular ones are shown on the figure, 15 between the dorsal origin and the lateral line, and 13 between the lateral line and the ventral origin. Details of small scales

* Fische aus Cashmir 1838, 21, pl. 2.

on the shoulder girdle, and entirely encircling the base of the pectoral fin, are quite at variance with *O. anjac.* Moreover the hind maxillary end reaches opposite the front of the eye, the depressed anal fin would fall far short of the anal base, and the dorsal fin base is but little more than the length of the anal fin base.

Day's figure of *Oreinus sinuatus** shows a very slender fish, with about 132 tubular scales in the lateral line, 20 scales between the dorsal origin and the lateral line, 11 between the lateral line and the anal origin, the chest, breast and prepectoral region apparently scaleless, also only a row of enlarged scales along the anal base, but none are so indicated forward. The description gives the scales in the lateral line as 105, with 21 to 25 between the dorsal origin and the lateral line to the anal fin. Day says this species "attains at least 2 feet in length". *O. plagiostomus* Heckel, also from Kashmir, differs at once in the greatly shorter barbels less than the eye. *O. griffithi* M'Clelland** is insufficiently described for identification. According to its describer "although perfectly distinct, differs but little in appearance from *Oreinus plagiostomus*".

I wish to acknowledge the gift of the present specimen, and the 2 preceding ones, made to the Academy by Mr. Schumacher, Graduate Student in the University of Pennsylvania. They were obtained by him at Zabol, eastern Iran, during September 1949, while engaged in archeological investigations. Mr. Schumacher has also given us the following note entitled "The Sayyad Fishermen of Central Eastern Iran."

> The Sayyad Fishermen live in the town of Zabol, Persia (formerly called Nasratabad, the legendary birthplace of Rustam), and in nearby villages. The men fish along the mouths of the Helmand River and in lake Hamun. Both the river and lake have sweet water. The lake and marsh land surrounding the southern shores of the lake form a large basin surrounded by sand deserts. This area is located at approximately 31° 30′ N. latitude and 61° 30′ E. longitude. The area is extremely hot in the summer time and mild in the winter. The climate is dry and the vegetation of the region is typical — palmettos, date palms, oleanders, and desert salt brush or camel's thorn.
>
> The Sayyads have been estimated to number ca. 20,000 to 25,000 population. They call themselves "Sistani", after the province; "Zaboli", after the town; or "Mahir", which means fisherman. They generally speak Persian, although a few have married Baluchi women and also speak the language of that tribe. Some Sayyads are of a Mediterranean type due to intermarriage with their neighbouring tribes, but there still seems to be a predominant old Sayyad type. These latter men have sloping foreheads, high brow ridges, big teeth, hairy bodies, brown eyes, wavy hair, big hands, wide feet, and are of a short-stocky build. They have very much the primitive Australoid cranial characteristics. They are probably Paleolithic survivals resembling the Australoids and Ainus.
>
> The Sayyad usually wear short knee length trousers and a loose blouse, since they are a great deal of the time up to their hips in water. Their head gear consists of a modern European type visored cap, or a white cloth skull cap. Occasipnally men were seen wearing turbans of cloth wound around their heads. Some are so poor their clothes are in rags. In town the families live in typical sun dried and brick houses with domed roofs. Along the river in their own villages the families live in reed mat huts made of the local river grasses.
>
> The men fish during the fall on the rivers and lake, preferring the early morning and evening hours when it is cool. Some have been seen fishing all day long if there is lots of wind. River fishing is preferred to lake fishing, and some of the men never go out onto the lake. Those who fish on the lake use boats and go out from 3 to 5 days at a time. For river fishing they use a seine net floated by gourds, and weighted by heavy stones tied to the bottom of the net. At either end the net is attached to a stick, and the sticks are tied to ropes which lead to shore. The nets are made of cotton thread and are called "Doum". The gourd is also used as a water

* Fishes of India, pt. 3, 1877, 529, pl. 124, figs. 4-a.

** *Calcutta Journ. Nat. Hist.* vol. 2, 1842, p. 581. Koonur R., Pushut, Afghanistan.

wing for swimming across the river. Four to 10 men can own a net and the day's catch is divided amongst those helping that day. They fish in teams of 4 to 7 men, or often in 2 teams with 2 nets. Half of the men are on one side of the river, the others on the opposite bank, and they pull each other's nets in and out of the river. When they make a haul, only the large fat fish are kept, the others are thrown back into the water. They catch 3 types of fish which they call "Mawda", "Anjaq", and "Mahrmahé"; the latter name meaning snake fish, which could possibly be an eel. One net catches 30 to 40 fish per day on good fishing days. The men eat only a few of their fish and sell the rest in the town of Zabol each afternoon.

The young men will become fishermen when they grow up. Women never are present during the fishing because they would bring bad luck. They have no means of preserving the fish they catch. They cook the fish into a soup in a pot of water. They never eat the fish raw for "it will kill us if we do".

During the winter the Sayyads cut bamboo, make reed mats, repair nets, and loaf. In the spring the men catch wild geese by their tails as the men hide in the reed blinds along the river bank. During the exceedingly hot summer months the families work on the wheat and barley harvest of the nearby farms of the area, but they own no farms of their own. The men receive one quarter of the crop harvested for their work.

These people all belong to the Shiite sect of the Moslem religion. They pray to God for more fish. If God helps them they will get more, and if God is angry they will get no fish at all. The men are a very simple, quiet, kind people, always humble. The tribe is divided into 33 clans, some of whom live on the Afghanistan side of the border. The Sayyads claim to marry only amongst themselves, but those living in the city of Zabol frequently marry outside their tribe. The most frequent marriages seem to be outside the clan but inside the tribe, with cross cousin marriage preferred. Some of the men questioned have taken the name of their mother's subtribe or clan, but since this is against the general Persian custom, it embarrassed them to mention this fact. A great deal of study is still necessary in this very interesting but desolate corner of Iran.

These mountain barbels are the first received from recently explored territory. Owing to most of the early descriptions being imperfect and often without figures, comment and comparative details are given above in the hope of tracing affinities and relationship. The mountain barbels (Schizothoracinae—Cyprinidae) are the dominant fishes of high Central Asia in Tibet, Mongolia, Turkestan, upper India, Kashmir, and Afghanistan. They comprise upwards of a hundred species, included chiefly in about 10 genera, of which *Schizothorax* comprises most of the species. They live in the high rivers and lakes of the Himalayas and the Himalayan subregion. Few are found in the rivers of the plains at any distance from the bases of mountain ranges. While some are scaleless, when the scales are present, as is most usual, they are very minute, and a membranous slit occurs before the anal fin which is bounded on each side by a row of vertically placed scales, which may extend back also close above the base of the anal fin. Sometimes the scales may also be enlarged along and behind the edge of the shoulder girdle.

(*anjac*, from the Sayyad vernacular anjaq.)

MURAENIDAE

*11. *Gymnothorax punctatus* Schneider

Gymnothorax punctatus Schneider, Syst. Ichth. Bloch, 1801, p. 526. Tranquibar.

Depth of body $2\,^2/_5$ in head; head $6\,^1/_5$, with front part produced considerably. Snout $5\,^1/_3$ in head; eye $13\,^3/_5$, $2\,^3/_5$ in snout; mouth cleft $2\,^1/_5$ in head, upper jaw projecting but little and mouth not closing completely; lips not especially thick, beset with very short, almost hairlike extensions; teeth in 1 front row in both jaws, moderately bent backwards; upper jaw with 18 teeth on right side, 7 front ones short and longer pointed

hind ones 11, those beneath eye longest; on left upper side 20 teeth as 5 short front ones and 15 longer hind ones, spaces between teeth variable; 2 depressible long fangs, well separated from each other in middle behind front row (so called mesial teeth) on intermaxillary; vomer bears 1 row of 3 short, undepressible and more or lees blunt teeth; lower jaw with 14 and 17 teeth on each side, smooth, with varying interspaces, and front 1 — 2 in lateral rows longest; front nostril in tube two in eye diameter; hind nostril with low, thick rim, at level of front eye edge, on upper lateral ridge of head; another ridge starts from upper hind edge of eye backwards; third ridge begins below eye and extends near mouth corner; interorbital space $1\ ^{9}/_{10}$ in snout. Gill opening elliptic, almost horizontal.

Dorsal begins before gill opening at space little shorter than mouth cleft, fin very fleshy, growing thinner on tail; anal starts just behind vent, well lower than dorsal; caudal tip rounded point.

Background brown to purplish brown, growing richer backwards. Mouth corner and gill opening within darker areas, with former well defined and latter fading out peripherically. More or less parallel lines distinguish the head region between the eye and gill opening levels. Dark line from mouth corner to gill opening, ends in loop slung around latter. Below right and left side lines an unbroken row of more lines joining those of opposite side. Above and below lateral main lines the additional lines become shorter, with uppermost line formed of stipples. Small light dots on sides and back of body, somewhat indistinct and confluent below, growing larger, more distinct and more distant from each other towards hind end, largest above on side of tail, but smaller on dorsal and anal fins, mostly of irregular shape with some rounded ones, in size smaller than pupil. A network of short, dark brown streaks on sides of hind part of head and front part of trunk, streaks lost in the richer ground colour more back. Length 745 mm. Eilat, Gulf of 'Aqaba, Red Sea, Israel. X.1949. A. Ben-Tuvia. SFRS: No. A 88.

Ben-Tuvia and Steinitz (Bull. 2 Sea Fisher. Res. Sta. Israel, June 1952, p. 4) have recorded this specimen as *Lycodontis* cf. *undulatus* (Lac.), giving its total length as 730 mm. The species is known from the tropical Indian Ocean. Originally fron Coromandel, it has also been found in Portuguese East Africa (Delagoa Bay). This specimen therefore establishes it as a member of the Red Sea fauna. It agrees largely with Day's figure, but the small light spots on the head are far smaller and more numerous. The jaw teeth largely uniserial are a fundamental character. Only 5 teeth in a median row on the vomer, with the first 2 grouped forward and the other 3 backward (opposite the eyes), is apparently not a great divergence in dentition. We have found greater variation in the rows of teeth, their number and emplacement, in other species of *Gymnothorax*.

*12. *Gymnothorax meleagris* (Shaw)

Lycodontis cf. *meleagris* (Shaw); Ben-Tuvia and Steinitz, Bull. 2 Sea Fisher. Res. Sta. Israel, 1952, p. 4 (Eilat).

One 110 mm. Eilat, RS, Israel. X.1949. A. Ben-Tuvia. SFRS: No. A 2. Appears close to *Gymnothorax laysanus* (Steindachner) [= juv. *G. meleagris*]. The white spots in a row all along the entire base of the dorsal are evenly spaced and well reflected above as less defined larger white blotches. All the pale spots on the body are less distinct and contrasted.

*13. *Gymnothorax nudivomer* (Guenther)

Lycodontis nudivomer (Guenther): Fowler, Mem. B. P. Bishop Mus., vol. 10, 1928, p. 59 (Honolulu; types of *G. goldsboroughii* Jordan and Evermann = *G. xanthostomus* Snyder). — Smith, Sea Fishes of S. Afr., 1949, p. 397, fig. 1125 (far south as Pondoland).

One 704 mm (length given as 724 mm in Ben-Tuvia and Steinitz, 1952: *Lycodontis* cf. *nudivomer* (Gthr.)). Eilat, RS, Israel. A. Ben-Tuvia. SFRS: No. A 76.

HEMIRAMPHIDAE

14. *Hyporhamphus xanthopterus* (Valenciennes)

Seven 78 to 85 mm. Ascalon, MS, Israel. 27.VII.1947. H. Lissner. HU: No. 1682. Dorsal and anal scaleless. Midcaudal rays nearly 2 eye diameters. Vertical fins largely to entirely scaleless.

One 124 mm. Haifa, MS, Israel. 26.II.1952. A. Ben-Tuvia. SFRS: No. M 134a.

The adult, as figured by Day, shows the ventral origin midway between eye and caudal base, whereas these specimens show the ventral origin midway between the gill opening and caudal base. An interesting Indian Ocean — Red Sea species, now additional to the Mediterranean fauna.

EXOCOETIDAE

*15. *Cypsilurus socotranus* (Steindachner)

Exococtus [error] *socotranus* Steindachner, Anzeiger Akad. Wiss. Wien, vol. 39 (24), November 20, 1902, p. 318. Between Abdal Kuri and Socotra; *Exocoetus socotranus* Steindachner, Denks. Akad. Wiss. Wien, vol. 71, 1907, p. 155 (type).

Depth 5 1/3; head 4, width 1 1/2. Snout 4 in head; eye 3, 1 1/3 in front interorbital width; maxillary reaches half way to eye; teeth very minute, indistinct; interorbital 2 1/3 in head, broad and slightly concave. Gill rakers 6 + 15, lanceolate. Scales 42 in lateral count from above gill opening to caudal base; caudal with fine scales basally. D. I, 11, fin height 1/2 its length as depressed; A. I, 8, origin below third branched dorsal ray, fin length 1 3/4 in depressed dorsal; caudal widely forked, lower lobe longer; pectoral rays I, 14, reaches opposite middle in depressed dorsal length; ventral rays I, 5, inserted midway between hind eye edge and caudal base, depressed fin reaches 1 1/5 to caudal base and as far back as depressed pectoral tips. Colour in alcohol apparently faded to drab brown on back and above and below pale drab. Iris dark grey. Dorsal and anal uniform pale brownish white. Caudal brownish, median rays pale brownish white subbasally and crotch of fin bordered grey behind. Pectoral brownish, paler below, uniform. Ventral pale or whitish, with greyish streak lengthwise on end and third membrane.

One 233 mm. Eilat, RS, Israel. XII.1949. A. Ben-Tuvia. SFRS: No. A 29. (This specimen was recorded as *Cypselurus* sp. by Ben-Tuvia and Steinitz, 1952, p. 5). Said to be near *Exocoetus brachysoma* Bleeker, but that species with a shorter snout and the eye equals the interorbital space. Bleeker's figure (Atlas Ichth. Ind. Neerl., vol. 6, 1866, pl. 1, fig. 1) shows a deeper fish, or with depth 4 1/2, more advanced ventral insertion and with depressed fin extended 1 1/2 times to caudal base. The figures (no. 2) of *Exocoetus*

neglectus by Bleeker, and that of *Exocoetus oligolepis* (pl. 2, fig. 3) are apparently identical, and the last name, adopted by Weber and Beaufort (Fishes Indo-Austral. Archip., vol. 4, 1922, p. 189), may also include *Exocoetus socotranus* Steindachner as another synonym.

16. *Danichthys unicolor* (Valenciennes)

Two 30 and 31 mm. Ascalon, MS, Israel. 27.VII.1947. H. Lissner. HU: No. 1683. Dorsal with a large black spot. D. 10. A. 10. Pectoral with a broad white lower border.

These specimens seem closest to the species figured as *Exocoetus oxycephalus* by Bleeker (Atlas Ichth. Ind. Neerl., vol. 6, 1866, p. 75, pl. 2, fig. 1), as the dorsal and anal origins are shown opposite one another. The uniform dark pectoral, pale dorsal, anal and caudal are, however, quite different. This species is known from the East Indies and Torres Straits.

The adult is figured in Jordan and Seale (Bull. Bur. Fisher. (U.S.), vol. 25, 1905 (1906), p. 209, fig. 12) as *Cypsilurus unicolor* C.V. 1846, based on a specimen $10\,1/4$ inches long from the Tasman Sea. We have also studied a specimen in the B. P. Bishop Museum, 42 mm long, from off Laysan Island (Fowler, Mem. B. P. Bishop Mus., vol 10, 1928, p. 80). Another Indo-Pacific species which entered the Mediterranean Sea. It has not been reported from the Red Sea.

CYPRINODONTIDAE

17. *Aphanius sophiae* (Heckel)

Lebias sophiae Heckel, Russegger's Reis., vol. 2, Abt. 3, 1846—49, p. 267, pl. 22, fig. 2. Persepolis, Persia.

One 41 mm. Ceger Oasis, Al Folluja, Euphrates River basin, Iraq. No. 2977-79. 16.IV.1952. N. A. Weber.

The figure of the female by Berg (Trudy Inst. Zool. Acad. Sci. U.R.S.S., vol. 8, pt 4, 1949, p. 849, fig. 7) agrees exactly in colour pattern.

ATHERINIDAE

*18. *Atherina presbyter* Jenyns

One 40 mm. Akrotiri Bay, Cyprus. 5.VIII.1950. HU: No. 2026. H. Steinitz. Scales 41. (Reported as *Atherina* sp. by H. Steinitz, 1952, p. 4.)

One 44 mm. Vavilas, Cyprus. 14.VIII.1950. HU: No. 2025. (Earlier record, same as above).

One 62 mm. Cyprus. 1951. HU: No. 2089. G. A. Mavromoustakis. Eye 3 in head. Depressed first dorsal $1\,2/5$ in space to origin of second dorsal.

19. *Hepsetia mochon* (Valenciennes)

One 55 mm. Cyprus. 1951. HU: No. 2089. G. A. Mavromoustakis. Space between tip of depressed spinous dorsal and origin of soft dorsal $3/4$ length of depressed spinous dorsal. Narrow grey axial lateral line, less in width than pupil.

20. *Pranesus pinguis* (Lacepède)

Atherina pinguis Lacepède, Hist. Nat. Poiss., vol. 5, 1803, pp. 371, 373, pl. 11, fig. 1. No locality.

Hepsetia pinguis Ben-Tuvia, Bull. no. 8 Sea Fisher. Res. Sta. Israel, August 1953, p. 16, fig. 9 (Haifa Bay, Israel). — Ben-Tuvia, Nature, vol. 172, September 5, 1953, p. 464 (Mediterranean coast of Israel).

One 68 mm. Iskanderun, MS, Turkey. II.1947. C. Kosswig. HU: No. 2052.

Three 74 to 98 mm. Eilat, RS, Israel. X.1949. A. Ben-Tuvia. SFRS: No. A 42/b.

Six 44 to 110 mm. Eilat, RS, Israel. XII.1949. A. Ben-Tuvia. SFRS: No. A 42/a.

One 73 mm. Caesarea, MS, Israel. XI.1951. A. Ben-Tuvia.

This series of specimens shows variation, as the blackish blotch on the pectoral is only present in the larger ones. All, likely due to preservation, have dark slate eyes and at base of each caudal lobe a dark or blackish veiled blotch. Both Klunzinger (*Atherina pinguis* in Fische des Rothen Meeres, vol. 1, 1884, pl. 11, fig. 2) and Ogilby (Mem. Queensland Mus., vol. 1, November 27, 1912, p. 38, pl. 12, fig. 1) have published figures which do not show the large prepectoral scales. Klunzinger's figure does not show the 2 median lengthwise rows of lateral scales with as deep exposures as Ogilby's, which agree with those of our specimens. Five small indeterminable specimens 12 or 13 mm long (HU: No. 1674) we refer doubtfully to *Pranesus*, found in a mixed lot from Ascalon, MS, Israel (H. Lissner. 27.VII.1947).

MUGILIDAE

21. *Chelon abu* (Heckel)

Three 37 to 62 mm. Ceger Oasis, Euphrates River system, Iraq. 16.IV.1952. N. A. Weber.

SYNGNATHIDAE

*22. *Dunckerocampus* **ben-tuviae** n. sp. Figure (22) type.

Acanthognathus dactyliophorus Bleeker: Ben-Tuvia and Steinitz, Bull. no. 2 Sea Fisher. Res. Sta. Israel, June 1952, p. 5 (Eilat) (misidentification).

Depth 26, 17 1/2 to vent; head 2 2/3, 4 1/10 to caudal base, width 7 7/8 in head length. Snout 1 1/2 in head from snout tip; eye 10, 6 1/4 in snout, greatly exceeds interorbital; maxillary length 3/4 of eye; interorbital 1 3/4 in eye, deeply concave; opercle with rather feeble keel inclined.

Rings 17 + 19. Upper trunk keel discontinuous with upper caudal keel, both overlap along and opposite base of dorsal fin. Lower trunk keel discontinuous with lower caudal keel; median lateral trunk keel continuous with lower caudal keel. Median ventral trunk keel continuous to vent. Ridges of snout and head largely entire or smooth. Each ridge of body ring marked by an acute spine behind, distinctly protruding backwards.

D. 21, on 1 + 3 subdorsal rings, fin small, low and rays very fine; A. 4, about half an eye diameter; pectoral rays 20, equals eye diameter; caudal (damaged) apparently with 9 rays?

In alcohol general colour pale or light yellow. Dark brown contrasted rings encircle the whole body, including snout, head and tail; 28 from pectoral to vent, and 45 on tail; about 30 from snout tip to pectoral; rings wider than pale interspaces, which are silvery white on head. Interspaces on trunk subequal with dark rings.

Type no. 72137 A.N.S.P. Eilat, RS, Israel. 20.XII.1949. A. Ben-Tuvia. SFRS: No. A 66. Length 155.1 mm.

Compared with Weber and Beaufort's figure of *Acanthognathus dactyliophorus* (Bleeker), our species shows twice as many transverse dark bars on the trunk and tail, besides the snout with many transverse dark bars above and the opercles with 3 transverse dark bars. Herald (Bull. U.S. Nat. Mus., no. 202, vol. 1, 1953, p. 250) says *Dunckerocampus multiannulatus* Regan (*Dorichthys multiannulatus* Regan, Rev. Suisse Zool., vol. 11, 1903, p. 413, pl. 13, fig. 3, Mauritius) is closely related, but differs in colour pattern. J. Green's figure, as published by Regan, shows the dark cross bands all much narrower than in our species, and moreover no dark bars are shown on the head. Its head length is $4\,^1/_5$ to caudal base, or $2\,^4/_5$ to the dorsal origin, its eye $3\,^1/_2$ in snout, though no anal fin is indicated and its caudal length is equal to the postorbital. Green's figure has no markings on the head, nor is any mention of them made in Regan's description. As *Acanthognathus multiannulatus* (Regan), Duncker (Mitteil. Naturh. Mus. Hamburg, vol. 37, 1914, p. 42, Mauritius) describes the colour as yellowish brown, with 4 or 5 bars on the opercle, and the dorsal and pectoral with blackish pigment. His larger specimen was 155 mm long.

(Named for Dr. Adam Ben-Tuvia).

Genus *Tiphle* Rafinesque

Tiphle Rafinesque, Caratteri Nuov. An. Sicil., 1810, p. 18. Type *Tiphle hexagonus* Rafinesque=*Syngnathus typhle* Linnaeus, virtual tautotype.

23. *Tiphle typhle* (Linnaeus)

One 270 mm. Cyprus, MS. 1951. G. A. Mavromoustakis. HU: No. 2091.

*24. *Hippocampus kuda* Bleeker

One 82.1 mm. Eilat, RS, Israel. 18.XII.1949. A. Ben-Tuvia. SFRS: No. A 48. D. 15, on 2 + 1 rings. A. 4. Pectoral rays 17. Filaments numerous, all moderate or short. Supraorbital longer than eye. Brown, snout paler. (Mentioned as *H.* aff. *kuda*, in Ben-Tuvia and Steinitz, 1952, p. 5).

*25. *Hippocampus histrix* Kaup

Hippocampus aff. *jayakari* Boulenger: Ben-Tuvia and Steinitz, Bull. 2 Sea Fisher. Res. Sta. Israel, 1952, p. 5 (Eilat).

One 105 mm. Eilat, RS, Israel. 18.XII.1949. A. Ben-Tuvia. SFRS: No. A 46. Rings 11 + 19. Median ridge of belly with a narrow black edge.

One 115 mm. Eilat, RS, Israel. 18.XII.1949. A. Ben-Tuvia. SFRS: No. A 47. Rings 11 + 17. Median ridge of belly pale brown like adjoining colour. Spines of upper keel of back and tail with small pale tip each, then broad blackish bar.

SERRANIDAE

26. *Epinephelus morrhua* (Valenciennes)

Serranus morrhua Valenciennes, Hist. Nat. Poiss., vol. 9, 1833, p. (320) 434. Mauritius.

One 64 mm. Tel Aviv, MS, Israel. 1950? H. Lewinsohn. HU: No. 2064. D. XI, 16. A. III, 9. Body brown generally, fins all paler. Above lateral line 3 lengthwise dark or blackish lines, uppermost along dorsal bases. Below lateral line 4 blackish lines, incomplete on tail behind and on caudal peduncle. From eye 4 dark lines extend back on side of head and 1 also back from below eye. Iris slate colour. First dorsal with median dark brown lengthwise line, dividing and broken, and 2 parallel rows of dark spots on second dorsal, with lower row more connected.

This is an Erythrean species, here reported for the first time from the Mediterranean Sea.

*27. *Apogon hyalosoma* Bleeker

One 23 mm. Eilat, RS, Israel. XII.1949. A. Ben-Tuvia. SFRS: No. A 76/b. Large black blotch at caudal base not equal to eye in size. Also a pale or whitish obscured axial lateral band. Not previously reported from the Red Sea. (Reported as *Apogon* sp., undetermined, in Ben-Tuvia and Steinitz, 1952, p. 6).

SERIOLIDAE

*28. *Seriola nigrofasciata* (Rueppell)

One 487 mm. Eilat, RS, Israel. XII.1949. A. Ben-Tuvia. SFRS: No. A 83.

Depth $4\,1/4$; head $3\,3/4$. Snout $3\,1/10$ in head; eye $4\,2/3$; maxillary reaches $4/5$ in eye; interorbital $2\,1/4$ in head; pectoral $1\,1/2$; ventral $1\,1/4$. Gill rakers $0 + 6$. D. V — I, 33; A. I, 16. Rather dark brown above, lighter beneath. Obscure or darker markings on back and upper surfaces. Dorsals and caudal dark brown, also main part of anal terminally. Pectoral brown, ventral darker. (Specimen on record as *Seriola* sp., Ben-Tuvia and Steinitz, 1952, p. 7).

CARANGIDAE

*29. *Carangoides ferdau* (Forskael)

One 335 mm. Eilat. 18.XII.1949. A. Ben-Tuvia. SFRS: No. A 55.

Depth $2\,1/2$; head $3\,2/3$. Snout $2\,7/8$ in head; eye $5\,2/3$, 2 in snout; maxillary $2\,4/5$, reaches eye; interorbital $2\,3/5$ in head. Lateral line with 24 or 25 scutes, foremost scute beneath dorsal ray preceding last ray. Naked area on breast extends just beyond root of ventral, but is far from reaching laterally high as stated by Weber and Beaufort. D. I, VII — I, 9, with depressed soft dorsal lobe $2\,4/5$ to caudal base; A. II — I, 22, lobe of soft fin reaching 2 to caudal base; pectoral $1\,7/8$. Uniform brown. No dark spot on opercle. Specimen reported as *Caranx* sp., in Ben-Tuvia and Steinitz, 1952, p. 7).

We have given these notes for comparison, as the figure of *Caranx bajad* by Rueppell (Atlas Reis. Nordl. Africa, Fische, 1828, p. 98, pl. 25, fig. 5) is evidently from a much smaller specimen.

POMADASYIDAE

*30. *Gymnocranius robinsoni* Gilchrist and Thompson

One 415 mm. Eilat. 24.XII.1949. A. Ben-Tuvia. SFRS: No. A 74.

Depth $2\,1/2$; head 3. Snout $2\,1/10$ in head; eye 4, $1\,4/5$ in snout; maxillary $3\,1/5$ in head, $1\,2/5$ to front eye edge; small teeth short, not prominent; interorbital 3 in head, convex; preopercle edge entire. Gill rakers 4 + 7, short, tubercle-like. Scales 48 — 2 in lateral line; 6 above, 17 below, 10 forward to occiput; 4 rows on cheek; 6 across opercle horizontally; caudal scaly basally. D. X, 10, long soft rays exceed spines, $1\,5/6$ in head; A. III, 9, longest rays $2\,1/3$; caudal peduncle depth $2\,4/5$; caudal $1\,1/8$, emarginate; pectoral rays II, 12, length $1\,1/4$ in head; ventral $1\,1/3$, long, pointed axillary scale equals eye. In alcohol brown, little paler below. On head 6 darker brown (blue) parallel bands, irregular from snout over cheek and with others less distinctly cross over opercle; also several narrow ones crowded along behind eye and over opercle above. These dark bands do not cross interorbital. On body above lateral line, 5 darker brown lengthwise bands, parallel with lateral line; below lateral line 14 similar bands, more obscure and converging behind. Fins all more or less uniform brown. Pectoral with narrow transverse darker brown basal bar. Longest ventral ray dark brown terminally.

Life colours as follows: "Silvery ground colour, back light lilac to purple. Above lateral line light brown spot on every scale. Head with upper side and region of eye brown. A lilac blue line begins below the eye, splits into 2 lines close to front nostrils, proceeding to the other side in corresponding fashion. Cheeks with wavy blue lines on brown ground. Light purplish blue spots on opercle. Ventral with spine lilac brown behind. Caudal with hind edge orange." (Specimen mentioned briefly as *Dentex robinsoni* in Ben-Tuvia and Steinitz, 1952, p. 7).

31. *Pomadasys maculatus* (Bloch)

One 30 mm. Eilat, RS, Israel. 26.IV.1950. H. Steinitz. HU: No. 2012.

SPARIDAE

32. *Pagellus mormyrus* (Linnaeus)

Fourteen 12 to 37 mm. Eilat, RS, Israel. 26.IV.1950. H. Steinitz. HU: No. 2013/II. The smallest, or those 14 mm or less, appear uniformly pale brown. Above this size traces of the dark caudal spot and the transverse dark bars show.

Three 20 to 32 mm. Eilat. 24.IV.1951. H. Steinitz. HU: No. 2071.

Apparently not previously reported from the Red Sea. Smith says (Sea Fishes Southern Africa, 1949, p. 273) "occurs right round Africa."

CENTRACANTIDAE

33. *Centracantus gracilis* (Bonaparte)

Smaris gracilis Bonaparte, Fauna Italica, Pesci, tomo 3, pt. 1, 1836, fasc. 15—17, pl., fig. 1. Italy.

One, Haifa, MS, Israel. 14.II.1952. A. Ben-Tuvia. SFRS: No. M. 520.

Depth 5; head $3^{2}/_{5}$, width $2^{1}/_{8}$. Snout 3 in head; eye $3^{1}/_{2}$, $1^{1}/_{8}$ in snout, equals interorbital; maxillary reaches slightly beyond front edge of eye, length $2^{4}/_{7}$ in head; jaws even in front; low interorbital largely level, width $3^{1}/_{3}$ in head. Scales 85 in lateral line to caudal base; 4 above, 15 below to front anal base. D. XI, 10; A. III, 9; pectoral 15; ventral I, 5; caudal forked, upper lobe $1^{1}/_{3}$ in head. In alcohol light brown, with 10 dark transverse bands on body. Close below lateral line, on fourth dark transverse band, a diffuse black blotch not large as eye.

MULLIDAE

34. *Upeneus vittatus* (Forskael)

One 121 mm. Tel Aviv, MS, Israel. XII.1953. A. Ben-Tuvia. SFRS: No. M 521. Agrees with Blegvad's coloured plate 7 (Danish Sci. Invest. Iran, pt. 3, 1944, p. 134), though in all 3 of his coloured figures of Mullidae the lateral line is not indicated.

A Red Sea species immigrated into the Mediterranean Sea.

35. *Upeneus moluccensis* (Bleeker)

One 108 mm. Iskenderun, MS, Turkey. II.1947. C. Kosswig. HU: No. 2062. Barbels rigid for more than half their length. Lateral line 35 + 3. D. VII — I, 8.

36. *Upeneus tragula* Richardson

One 86 mm. Iskenderun, MS, Turkey. C. Kosswig. HU: No. 2054. Barbels reach behind to vertical through hind edge of preopercle. Scales 30 in lateral line; $2^{1}/_{2}$ above, $4^{1}/_{2}$ below. D. VII — I, 8. A. I, 6. Minute spine on opercle.

One 115 mm. Tel Aviv, MS, Israel. XII.1953. A. Ben-Tuvia. SFRS: No. M 522. Barbels not quite reaching opposite hind preopercle edge. Scales in lateral line 29 + 1; below $4^{1}/_{2}$. Apparently Blegvad's coloured figure (Danish Sci. Invest. Iran, pt. 3, 1949, pl. 7, fig. 3) is from a much larger specimen, as ours shows the eye $3^{1}/_{3}$ in head, distinctly 6 transverse brown bars on the upper caudal lobe and the lower caudal lobe uniform.

One 85 mm. Haifa, MS, Israel. 4.I.1952. A. Ben-Tuvia. SFRS: No. M 75/a. With an obscure ill-defined axial darker brown band, extending out on caudal to basal part of lower lobe.

*37. *Dascyllus trimaculatus* (Rueppell)

One 40 mm. Eilat, RS, Israel. 10. — 12.V.1949. G. Haas. HU: No. 2008. Scales in median predorsal line in a regular row of 7 scales. This row preceded by smaller scales, set irregularly, they decrease in size, becoming still denser and still more irregular in setting towards the snout where they are minute, so altogether about 30 predorsal scales. In upper section of lateral line 19, followed by scale slightly lower and intermediate between upper and lower portion, which has 9 scales and a few more on caudal base. Transversely 4 scales above lateral line, 10 below (excluding basal scales of dorsals and anals). Preorbital scale rows 3 or 4, difficult to verify because of irregular arrange-

ment; 2 or 3 infraorbital rows; 5 cheeks rows. Upper dentition as a front row of simple short conical teeth; 6 front ones strongest and well spaced. Behind them a band of minute teeth, set in several irregular rows, the band thinning out laterally. Lower teeth similar, but front row shorter than above and band consisting of only 2 rows of minute teeth. Maxillary almost reaches front edge of eye. Infraorbital and preorbital edges finely serrated, also upper part of preopercular edge, serrations more coarse toward lower corner of preopercle. Opercular edge serrated in part. Scaleless elongated area from nostril to edge of orbit. Free part of maxillary with row of small scales.

One 130 mm. Eilat, RS, Israel. X.1949. A. Ben-Tuvia. SFRS: No. A 128. Without white blotches. Body deep brown. Top of head still darker. Fins almost black, except pectoral which is light brown to hyaline and with black dot at base above. Smaller specimen (HU: No. 2008) with small silvery white blotches, each between middle of upper lateral line and dorsal base. Head and body as in larger specimen, but caudal peduncle somewhat lighter towards caudal base. Spinous dorsal with light band in half its height, passing behind into a similar band just above soft dorsal base. Soft dorsal and caudal with free edge white. Pectoral hyaline.

LABRIDAE

*38. *Thalassoma pavo* (Linnaeus)

Three 18 to 26 mm. Vavilas, Cyprus, MS, 14.VIII.1950. H. Steinitz. HU: No. 2024. Described under *Thalassoma* sp. in H. Steinitz, 1952, p. 7.

*39. *Thalassoma fuscum* (Lacepède)

One 19 mm. Eilat. 19.XII.1949. A. Ben-Tuvia. SFRS: No. A 63/a. Opercles scaleless. Dorsal spines 8. (This specimen was mentioned as *Thalassoma* sp. by Ben-Tuvia and Steinitz, 1952, p. 9).

*40. *Thalassoma* **klunzingeri** n. sp. Figure (24) type.

Thalassoma aff. *ruppellii* Klunzinger, Ben-Tuvia and Steinitz, Bull. no. 2 Sea Fisher. Res. Sta. Israel, 1952, p. 9 (Eilat) (misidentification).

Depth 3; head $3\,^2/_5$, width 2 in its length. Snout $2\,^3/_4$ in head; eye 6, $2\,^1/_2$ in interorbital; mouth cleft short, reaches opposite front nostril, 5 in head; 2 close-set canines in front of upper jaw and a single canine forward in lower jaw; interorbital convexly elevated, width $3\,^2/_3$ in head. Gill rakers 5 + 10, short, lanceolate.

Scales 22 + 5 in lateral line, with tubes well branched on most of forward scales, less so backward on tail; 2 above to dorsal base, 9 above anal origin to lateral line; small patch of scales above opercle, head otherwise scaleless. Vertical fin bases scaly, on soft dorsal and anal scaly areas gradually lower behind. Caudal base also finely scaled. Scales on chest and breast smaller than on sides of body.

D. VIII, 13, last spine $3\,^2/_3$ in head, seventh ray $2\,^7/_8$; A. III, 11, third spine 4, fifth ray $2\,^1/_2$; lower caudal lobe $3\,^2/_7$ in rest of fish, hind edge of fin undulate; least depth of caudal peduncle 2 in head; pectoral rays I, 12, fin $1\,^1/_4$ in head; ventral $1\,^3/_4$, rays I, 5.

Colour in alcohol largely brownish, with pale axial band from head to caudal base, on caudal peduncle running along close above tubes of lateral line. On back each scale above lateral line with obscure blackish blotch. On head 2 dark brown irregular narrow bands extending back from eye, upper lost in scaly patch above opercle and lower reaches gill opening. On cheek and below 2 horizontal bands of darker extend to gill opening. Hind part of opercle and broad border of gill opening pale or buff, also pectoral base. Iris slate. Vertical fins pale or light brown, with blackish basal bar covering whole basal scaly area, and 2 dark parallel medial lines whole extent of fins. Anal like dorsal except without 2 dark lengthwise lines. Pectoral with black terminally, and small black blotch in axil above. Ventral light brown.

No. 72138 A.N.S.P. Eilat, RS, Israel. 15.XII.1949. A. Ben-Tuvia. SFRS: No. A 25. Length 250 mm. Type. Also 2 paratypes, Sea Fisheries Research Station, Haifa, Israel. Same data as type.

Colour from field notes: alternating bars of lilac brown and green across body. Broad lengthwise red band in middle of body and below it a less conspicuous light red band. Edge of belly lilac. Head with upper region of snout light green, growing dark green behind. Several green lines on head, first from eye backwards to first cross bar on body; second from near mouth passes eye and reaches pectoral fin base; third from corner of mouth, passes below eye and reaches hind edge of opercle before pectoral fin base; fourth forms $^3/_4$ of a circle on cheek; fifth line within circle just described. In alcohol the pectoral fin has the black spot above, and on the inner side of the fin the black spot extends further down than on the outer side.

These specimens differ from the accounts of Rueppell and Klunzinger in that the anal fin has no lengthwise red band, without mention of the black spot of the pectoral fin base.

(For C. B. Klunzinger, notable for his works dealing with Red Sea ichthyology.)

SCARIDAE

*41. *Scarus sordidus* Forskael

One 338 mm. Eilat, RS, Israel. 1949. A. Ben-Tuvia. SFRS: No. A 135. Canines 2 above and single lower one between upper ones. Scales 18 + 6 + 1; above $1\,^1/_2$, $5\,^1/_2$ below; 4 predorsal; 2 rows on cheek, lower row of 5 scales only. D. IX, 10. A. III, 9. Pectoral II, 13. Upper and lower caudal points well extended. (Recorded as *Scarus* aff. *sordidus* in Ben-Tuvia and Steinitz, 1952, p. 9).

URANOSCOPIDAE

*42. *Uranoscopus archionema* Regan

Depth 4; head $2\,^2/_5$, wide as long. Broad snout flattened; eye $1\,^1/_2$ in orbit; maxillary vertical, its hind edge not reaching front of eye; entire top of head, upper half of cheek, and all of opercle and preopercle rugose; humeral spine broad, triangular, single, equals $^1/_4$ of head length. Scales 40 in a lateral row; predorsal nude. D. I, IV — 1, 11. A. 13. Pectoral 17. Ventral 5. Caudal convex behind. Pectoral $1\,^3/_5$ in head, ventral $2\,^1/_6$,

caudal 1 1/2. In alcohol brown above, head paler and entire under surfaces of both head and body paler to whitish. First dorsal black. Second dorsal with rays dark grey, membrane pale to whitish. Caudal rays brown, rays grey black terminally and fin basally tinged with yellowish brown. Anal cream white, last rays grey terminally. Pectoral dark grey, lower rays tipped pale or white. Ventral white like belly. Back marked with scattered small black spots.

One 320 mm. Eilat, RS, Israel. IX.1950. A. Ben-Tuvia. SFRS: No. A 91. Specimen reported as *Uranoscopus* sp. in Ben-Tuvia and Steinitz, 1952, p. 9.

CIRRHITIDAE

*43. *Cirrhitichthys aprinus* (Cuvier)

One 32.7 mm. Eilat, RS, Israel. X.1949. A. Ben-Tuvia. SFRS: No. A 336. Front nostril with elevated rim, behind with slender bifid extension. Preorbital not serrated. Scales 45 in lateral line, 3 1/2 above, 10 below. Interorbital scaleless. Patches of grouped small scales creep upon fins at several places, sometimes to middle in height. Ventral scaleless. D. X, 12; A. III, 6, second spine longest and strongest; pectoral 7, 6.

Ben-Tuvia and Steinitz mention (1952) they find no Red Sea record, though Klunzinger records it (F. Roth. Meer., 1884, p. 67).

THUNNIDAE

*44. *Euthynnus affinis* (Cantor)

Thynnus affinis Cantor, Journ. Asiatic Soc. Bengal, vol. 18, pt. 2, 1849 (1850), p. 1088. Penang.

Euthynnus affinis affinis Fraser-Brunner, Ann. Mag. Nat. Hist., ser. 12, vol. 2, August 1949, p. 624 (Aden).

Euthynnus alleteratus (Raf.), Ben-Tuvia and Steinitz, 1952, p. 10 (Eilat) (misidentification).

Depth 4 1/10 to 4 1/5; head 3 3/5 to 3 4/5, width 1 7/8 in its length. Snout 3 1/5 to 3 1/3 in head; eye 6, 1 4/5 in snout; maxillary 2 1/4 to 2 1/3 in head, reaches opposite eye centre; front part of interorbital 3 1/8 to 3 1/4 in head. Gill rakers 9 + 25, lanceolate.

Corselet with hind lobe extending 1 to 1 1/2 eye diameters behind tip of depressed pectoral fin.

D. XV — II, 10 — 8, second spine 2 1/4 to 2 1/3 in head, origin of second dorsal midway between hind preopercle edge and caudal base, or slightly nearer caudal base in larger specimen; anal origin midway between base of third dorsal spine and caudal base, rays III, 10 — 7; caudal small, widely forked, upper lobe 1 2/3 to 2 in head; pectoral 2 to 2 1/8.

Back dark olive brown, with 13 or 14 dark waved blackish bands, inclined upwards and backwards. Lower sides and underneath pale drab. Below pectoral 3 grey black diffuse spots (only 1 in larger specimen), nearly equidistant (most posterior in smaller specimen opposite middle of depressed pectoral). First dorsal membrane transparent, spines brown. Second dorsal and finlets pale grey. Caudal brownish. Anal and finlets pale grey or drab, like belly. Pectoral brown, grey black terminally, inside and outside border of ventrals whitish, with broad grey black bar terminally.

Two 287 and 300 mm. Eilat, RS, Israel. X.1949. A. Ben-Tuvia. SFRS: No. A 337/1,2.

SCORPAENIDAE

45. *Scorpaena erythraea* Cuvier

Scorpaena erythraea Cuvier, Hist. Nat. Poiss., vol. 4, 1829, p. (232) 316. Red Sea.

Depth $2\,^5/_6$; head $2\,^1/_4$, width $1\,^1/_2$ in its length. Snout $2\,^4/_5$ in head from snout tip; eye 5, $1\,^1/_2$ in snout, twice interorbital width; maxillary reaches opposite front of eye, length $2\,^1/_8$ in head, expansion $1\,^1/_2$ in eye; closed lower jaw slightly protruding; fine teeth in villiform bands in jaws; a triangular patch of similar teeth on vomer; palatines toothless; interorbital deeply concave, with rather deep depression close behind separating occiput; long supraocular tentacle flattened, with some small marginal filaments, $1\,^2/_5$ times eye or when depressed reaching $^2/_3$ to spinous dorsal; skinny flap from preorbital spine $^3/_4$ long as eye, with some short filaments.

Nasal spine sharp; prominent upper marginal preocular spine distinct, followed by supraocular spine close before supraocular tentacle and then broad upper spine above hind eye edge; nuchal spine small, then larger parietal-occipital spines connected; 2 long low postocular spines, close-set above latter; suborbital stay with 2 long spines, followed by short one on cheek and finally small one at preopercle edge and larger one at hind preopercle edge, on which and below are 4 other less conspicuous spines; at front upper part of opercle 2 ridges diverge, each ending in a spine, upper at opercular flap, and lower well above pectoral or close before large humeral spine.

Scales 48? + 3 along lateral line; tubes 16, extend till opposite last $^2/_5$ of soft dorsal base; scales 10 above lateral line, 5 to soft dorsal origin, 14 below to anal origin. On body scales all with more or less parallel oblique courses, as if crossing lateral line from below and then sloping upwards and backwards. Small scales on top and upper sides of head, or on front of opercle; muzzle and under surfaces of head scaleless, also prepectoral region; chest, breast, axillary region and belly scaleless. On fins only caudal base scaly.

D. X, I, 10, last spine $1\,^3/_4$ in spine of second dorsal; edges of first dorsal membranes each notched behind tip of spine, which bears a skinny lappet; A. III, 5, second spine longest, third little shorter and first $2\,^1/_8$ in second; caudal convex behind, $1\,^1/_2$ in total head length; pectoral I, 4, XII, only 4 of upper rays divided, fin $1\,^3/_5$ in total head length; ventral $1\,^2/_3$, rays I, 5, with innermost ray connected by membrane with abdomen; caudal peduncle short above, its least depth $1\,^1/_3$ in its length, measured from caudal base to base of last anal ray.

Colour in alcohol light brown generally, with contrasted dark brown to blackish markings. Dark brown blotch on preorbital; blackish blotch from lower eye edge down over front of cheek, followed by another set closely behind. Black bar back from upper hind eye edge. As seen from above occipital depression blackish. On body 5 transverse blackish bands more or less wider than pale interspaces, though latter on front of caudal peduncle widest; third black band variable as less extensive on left side of body than on right side. Under surface of head with some obscure dark markings, spots or blotches. Chest, breast and belly immaculate and pale. Second blackish transverse band reflected on middle of first dorsal and third less so at hind part of fin. All markings on first dorsal more or less greyish, variable, with speckled appearance and dark pencilled lines. Second dorsal similar. Caudal with broad outer area and subbasal narrower

area greyish and whole fin with more or less dark pencilled lines. Anal with 2 broad blackish bands and pencilled dark lines. Pectoral similar. Ventral grey black terminally, with obscure dark lines and specks.

One 70 mm. Eilat, RS, Israel. IV.1941. R. Kenneth. HU: No. 2073. Apparently a little known species, therefore the above description has been provided.

*46. *Scorpaena* **aqabae** n. sp. Figure (25) type.

Depth $2\,1/2$ to $2\,3/4$; head $2\,1/5$ to $2\,1/6$, width $1\,3/5$ to $1\,9/10$. Snout 3 to $3\,1/8$ in head, its front end nearly level with lower eye edge; eye 4 to $4\,1/10$, exceeds interorbital; maxillary $1\,7/8$ to 2 in head, extends to or slightly beyond eye centre, its broad expansion behind exceeding the pupil; closed jaws about even in front, with gape little inclined from horizontal; teeth fine, minute, in rather wide bands in jaws; similar but small teeth, and in narrower bands on vomer and palatines; concave interorbital width $1\,2/5$ to $1\,1/2$ in eye. Top of head above and behind eye convex, without pit. Suborbital stay without spines, except large one at its lower hind end; 4 more small spines along lower hind preopercle edge. Gill opening extends forward opposite middle of eye. Gill rakers 1 + 11, small, club-like, with foremost lower 4 rudimentary.

Strong nasal spine each side of snout; front supraorbital spine low, followed by 2 larger ones each side; then 4 pairs of spines to suprascapula at beginning of lateral line; strong inclined scapular spine above pectoral base; opercle with 2 strong spines.

Tubes in lateral line large, 25 or 26; sales along lateral line 36; 8 above, 11 below to anal origin; predorsal scales small, extend forward opposite hind eye edge; postocular region scaled, inclusive of opercles; muzzle and interorbital scaleless; fins scaleless, excepting caudal base and a few scales on anal base.

D. XI, I, 9, longest spine exceeds longest ray or $1\,9/10$ in head; A. III, 5, spines slender, second spine $1\,4/5$ to $2\,1/5$ in head, exceeds rays; least depth of caudal peduncle $4\,1/8$ to $5\,3/4$; caudal convex behind, length $1\,2/3$ to $1\,3/4$; pectoral 6, IX, depressed fin reaching anal; ventral I, 5, subequal with pectoral.

Colour in alcohol brown, variegated with white. Iris white. Inside of mouth pale. Dark brown diffuse blotch on lower cheek. Under surface of head and chest pale or white. On body 4 ill defined transverse bands, greatly wider than irregular narrow whitish interspaces. Entire lower half of head, chest, breast, prepectoral region and belly with small crowded variable whitish spots or dots. Dorsals pale, with brownish cloudings. Caudal brown basally, terminally dark grey. Pectoral with 3 diffuse dark brown blotches. Ventral pale basally, dark grey terminally. Anal pale or whitish, with dark diffuse shade basally behind.

No. 72139 A.N.S.P. Eilat, RS, Israel. X.1949. A. Ben-Tuvia. SFRS: No. A 127/1. Length 51 mm. Type. Also paratype 42 mm. Same data. SFRS: No. A 127/2. No. 72140 A.N.S.P. (These specimens were mentioned, though without generic name, in Ben-Tuvia and Steinitz, 1952, p. 10).

This species approaches most closely to *Scorpaena mossambica* Peters in its profile of body, relative proportion of fins and colour pattern. It differs strikingly in the absence of the long supraorbital tentacle of that species, more deeply incised notch of the dorsal fins and the spinous dorsal being much higher than the soft dorsal.

(Named for the Gulf of Aqaba, the type locality for the species.)

PLATYCEPHALIDAE

Papilloculiceps n. g.

Type *Platycephalus grandidieri* Sauvage

Teeth villiform, in bands in jaws. Two parallel keels of suborbital stay entire, each ending behind in a short spine. No fine denticulations or granulations on ridges of head. Spines of head behind eyes large and conspicuous. Small and obscure flattened papilla on upper surface of the eyeball. No membranous flap below preopercular spine. Scales small. Lateral line unarmed. Dorsal rays 12.

The genus is specially characterized by the entire ridges on the suborbital stay and the small and inconspicuous flattened papilla on the upper surface of the eyeball.

(*papilla* nipple + *oculus* eye + *ceps* head, contraction for *cephalus*.)

*47. *Papilloculiceps grandidieri* (Sauvage)

Platycephalus grandidieri Sauvage, Nouv. Arch. Mus. Hist. Nat. Paris, Bulletin, vol. 9, 1878, p. 56. Zanzibar; Madagascar; Hist. Nat. Madagascar, Grandidier, vol. 16, Poiss., 1891, p. 308, pl. 36, figs. 3—3q (Zanzibar; Madagascar).

Platycephalus tentaculatus (Rueppell): Ben-Tuvia and Steinitz, Bull. 2 Sea Fisher. Res. Sta. Israel, June 1952, p. 10 (Eilat) (misidentification).

Depth $7\,^5/_6$; head $2\,^1/_2$, width $1\,^2/_3$. Snout $2\,^5/_6$ in head, measured from snout tip; eye 9, orbit 9; eye $3\,^2/_5$ in snout, $1\,^2/_5$ in interorbital width; bony interorbital subequal with eye; maxillary reaches front of orbit; lower jaw well protruded before tip of upper jaw; upper part of eyeball with small, flattened papilla.

No nasal spine. Preorbital spine strong, followed by long strong keel above eye, behind with very small spine well back or near hind end of eye, then another broad and blunt one still a little back and finally a large tympanic spine, from which 5 or 6 bony keels converge back to median line of occiput; pair of little more closely set coronal spines; outside of last a parietal spine each side, followed by much longer nuchal and occipital spines; postorbital spine strong, well back and nearly opposite coronal spines or upper front of opercle, another spine, followed finally by row of 3 long keels each ending in a spine, above opercle; suborbital stay with 2 entire parallel keels, each ending in a single short spine, lower a little broader; opercle with 2 spines. Gill rakers [left arch] 2 + 4, lower or epibranchial largest, equal bony interorbital space.

Scales 90 in lateral line to caudal base; 11 above to second dorsal origin, 22 below to anal origin; 14 predorsal forward to coronal spines; postorbital and opercles scaly, head otherwise scaleless; caudal base finely scaled.

D. I, IX — 12, as depressed first dorsal not reaching second; A. I, 11, edge of membrane behind end of each ray well notched; caudal peduncle depth equals orbit; caudal in total head length, its hind edge convex; pectoral II, 12, VII, fin length from its origin $1\,^2/_5$ in total head length; ventral I, 5, fin length $1\,^1/_3$ in head.

In alcohol brown above, rather dark, obscurely with rather large black blotches. Under surfaces of head and body uniformly pale, evidently whitish in life. Fins all

more or less with light or pale brown ground colour. Spinous dorsal with 3 large black blotches on outer part of fin, intervening narrowed areas mottled with small dark spots. Soft dorsal with 3 large black blotches on each ray, and with small dark spots on areas between. Each caudal ray with 3 or 4 black blotches. Pectoral with rather obscure dark spots, 7 to 10 on longer rays. Ventral with 5 or 6 large black blotches on each ray.

One 485 mm. Eilat, RS, Israel. X.1949. A. Ben-Tuvia. SFRS: No. A 85. This species not previously known from the Red Sea.

GOBIIDAE

*48. *Gobius paganellus* (Linnaeus)

Three 63 to 70 mm. Limassol, Cyprus, MS, 1951. G. A. Mavromoustakis. HU: No. 2093. All show the body with black lateral blotches, little below middle of side. Many other smaller dark blotches along side of body, both above and below, where fewer.

Two 94 to 105 mm. Limassol, Cyprus, MS, 1951. G. A. Mavromoustakis. HU: No. 2092. Scales 30 in axial lateral row. D. VI, 14. A. 12. Dorsal filaments exceed longest dorsal rays.

*Three 49 to 71 mm. Vavilas, Cyprus, MS. 14.VIII.1950. H. Steinitz. HU: No. 2023. (Recorded as *Bathygobius* aff. *paganellus* in Steinitz, 1952, p. 9).

*One 39 mm. Agios Thyrsos, Cyprus, MS. 18.VIII.1950. J. Wahrman. HU: No. 2027. (Likewise recorded, see preceding item).

PERIOPHTHALMIDAE

49. *Boleophthalmus dentatus* Valenciennes

Boleophthalmus dentatus Valenciennes, Hist. Nat. Poiss., vol. 12, 1837, p. (157) 208, pl.355. Bombay, India. — Day, Fishes of India, pt. 2, 1876, p. 306, pl. 64, fig. 10 (Bombay; Kurrachee).

Two 155 to 170 mm. Fao, Iraq, head of Persian Gulf. 29.XII.1950. From irrigation ditches under date palms. N. A. Weber.

SIGANIDAE

50. *Siganus spinus* (Linnaeus)

Sparus spinus Linnaeus, Syst. Nat., ed. 10, pt. 1, 1758, p. 281. East Indies.
Siganus rivulatus (Forskael); Ben-Tuvia, Bull. 8 Sea Fisher. Res. Sta. Israel, August 1953, p. 27, fig. 17 (Mediterranean Sea, Israel) (misidentification).

D. XIII, 9. A. VII, 9. Pectoral II, 13 or 14. Ventral I, 3, I. Scales 15 to 20 above lateral line. Breast, chest, belly, subopercle and opercle below silvery, head otherwise brown, also back, hind part of body and tail. Small dark grey blotches on sides of body. Same colour found in patches on bases of dorsal and anal. Ventral with 3 dark cross bars. Caudal with dark basal cross band, hind half dusky mottled, and outer upper and lower rays with indications of dark bands.

One 72.5 mm. Iskenderun, MS, Turkey. II.1947. C. Kosswig. HU: No. 2060. This is another Indo-Pacific species which has reached the Mediterranean.

CALLIONYMIDAE

51. *Callionymus* **haifae** n. sp. Figures (26) head from above, (27) head from below, (28) lateral view of type, male, (29) left preopercle spine; paratype female, (30) head from above, (31) lateral view, (32) left preopercle spine.

Depth 8 2/3 (male), 8 7/8 to 9 1/3 (female); head measured to gill opening 3 5/6 (male), 3 4/5 to 4 1/8 (female), width 1 (male) to 1 1/10 (female) in head length. Snout 2 3/5 in head (male), 2 3/5 to 2 2/3 (female), oblique in profile, depressed; eye 3 1/6 (male), 3 1/8 to 3 1/4 (female); 1 1/2 (male) in snout, 1 1/4 to 1 2/5 (female); maxillary reaches 2/3 to eye (male), 2/3 to 3/4 (female), or 2 3/4 to insertion of preopercular spine (male), 2 1/2 to 3 (female); lobe of upper lip at mouth corner not pendulous, in female as slightly projecting flap; finely villiform teeth short, but rather broad band in front of each jaw; small patch of a few small teeth on vomer and a narrow band on each palatine; interorbital very narrow, little lower than upper orbital border; preopercle spine long as orbit, with short front basal spine directed forward and hind edge with 5 retrorse denticles along inside. Gill opening superior, an eye diameter behind eye.

Skin smooth, soft and pliable. Cranium immediately behind eyes covered with thin skin. Lateral line distinct, high at first and complete to caudal base.

D. I — III — 10 (male), first spine separated from rest of fin, prolonged in a slender flexible filament, at least to middle of soft dorsal in type (in small male much shorter); female with D. IV — 10; A. 10 in both sexes; caudal of type with 2 median rays exserted, 1 2/3 in rest of fish, in female 1 9/10; pectoral rays 17; ventral I, 5.

Above dull brown, with very obscure, variable pale and light spots or blotches on specimens preserved in alcohol. Also some grey, or dark grey specks and spots before pectoral. Transverse dark grey band across upper front of snout. Along middle of side of body, and behind along lateral line 5 or 6 more or less slightly larger and more conspicuous dark blotches. Eye slate colour. Under surface of head and body whitish. First dorsal largely black, filamentous first spine dull brownish. Soft dorsal pale grey, with dark or grey black blotches. Caudal with 2 median rays exserted and fin generally more or less transparent, with 5 rows of black spots, mostly on membranes and small or inconspicuous spots along upper and lower fin borders. Smaller male with spots less vivid and smaller. Females with first dorsal largely pale, with some brown marks, and third membrane black on greater outer portion. Female with soft dorsal transparent and marked inconspicuously with numerous small dull brown specks or spots. Females without exserted caudal rays, with 5 transverse rows of dark brown blotches. Male with greater upper portion of pectoral marked with numerous small dark spots on each ray and lower rays whitish. Female with spots rather fewer and paler. Male with ventral dark grey terminally and with a few dark spots on inner rays. Female with pale ventral and but few dark spots on inner rays. Anal pale to whitish, in female with dark narrow submarginal line near edge of each membrane.

No. 72141 A.N.S.P. Haifa, MS, Israel. SFRS: No. M 108. Male. Type. Length 50 mm. I.1952. A. Ben-Tuvia.

Nos. 72142 to 72144 A.N.S.P. Haifa, MS, Israel. Paratypes. 1952. Length 96 to 115 mm. ♂ and 2 ♀. (SFRS: No. M 108/a, Haifa Bay, 28.X.1952; SFRS: No. M 72/a, Haifa Bay, 18.IV.1946; SFRS: No. M 72/b, no data).

All the above specimens collected by Adam Ben-Tuvia. The species is largely characterized by the 5 antrorse denticles along the hind edge of the preopercle spine besides the one directed forward in front, the male with the first dorsal spine separated and prolonged in a filament but not so in the female, the male with the 2 median caudal rays exserted but not so in the females, and the coloration as described above. So far as we are able to find it appears not closely related to any of the Mediterranean species.

(Named for Haifa (Israel), the place of origin of the specimens).

CARAPIDAE

52. *Carapus* **variegatus** n. sp. Figure (23) type.

Depth $6\,1/3$ to $11\,1/2$, head $6\,1/4$ to $6\,1/3$, width $2\,1/5$ to $2\,4/5$ in its length. Snout $4\,2/3$ to 6 in head, convex; eye 4 to $4\,1/6$; maxillary $1\,7/8$ to 2, its edge free behind; upper teeth minute, apparently as a single row, with pair of slightly larger canines forward and rather closely set; lower teeth in 2 distinct rows, with those in outer row larger and more or less widely set; vomer with median row of 2 or 3 enlarged teeth besides row of smaller ones each side; band of small cardiform teeth on each palatine; interorbital convex. Gill opening extends forward below slightly before middle in head, but not to eye.

Skin scaleless, smooth. Lateral line axial, imperfect, indistinct on tail.

Dorsal as very imperfect low cutaneous ridge, beginning well behind depressed pectoral; anal deeper than dorsal, begins close behind vent, which is situated close before pectoral base.

Colour in alcohol very pale or light brown, or fawn colour. Cranium dark grey, with some obscure darker blotches. Iris silvery, with grey above. On body many scattered darker brown flakes, spots or rings, most numerous and crowded towards hind end of tail. Pectoral pale.

No. 72145 A.N.S.P. Eilat, RS, Israel. 23.IV.1951. H. Steinitz. HU: No. 2065. Length 123 mm. Type. Two paratypes Nos. 72146 and 72147 A.N.S.P., 85 and 77 mm, same data, appear to differ only in their more spotted coloration. All were obtained in holothurians. These paratypes have from 4 to 8 dark spots on the hind half of the head. Structurally and otherwise they largely agree with *Carapus homei* (Richardson), and possibly may even be found to be the same species. The colour is not noted in the original account by Richardson. His figure of *Oxybeles homei* is shown as unmarked or uniform. Specimens we have examined from Tahiti and Honolulu, Hawaii, though having been long in alcohol, are uniform pale brown. Beaufort (Fishes Indo-Austral. Archip., vol. 9, 1951, p. 450) gives the colour as "yellowish, often with a golden hue along sides, sometimes with black spots on tail."

One 87 mm. Eilat, RS, Israel. 23.IV.1951. From intestine of a holothurian. H. Steinitz. HU: No. 2066. Paratype.

Two 85 to 120 mm. Location and date unknown. Obtained when dissecting holothurians purchased from the Zoological Station at Naples. HU: No. 2010. Head $7\,1/2$ to $7\,3/4$ in total length.

(*variegatus*, variegated, name given from its variable blotched or spotted coloration.)

GOBIESOCIDAE

53. *Lepadogaster lepadogaster* (Bonnaterre)

One 55 mm. Cyprus, MS. 1951. G. A. Mavromoustakis. HU: No. 2088. Uniform light or pale cinnamon brown. Iris grey. "Snout depressed, produced like the bill of a duck". Bifid nasal tentacle $^7/_8$ of eye. Vertical fins confluent, with caudal convex behind.

MONACANTHIDAE

*54. *Monacanthus cirrosus* Kossmann

Monacanthus cirrosus Kossmann, Verh. Nat. Med. Ver. Heidelberg, N.F., vol. 1, 1877, p. 413. Red Sea. — Kossmann and Reuber, Zool. Ergebn. Reis. Roth. Meer, vol. 1, 1877, p. 30, pl. 2, fig. 10 (idem).

One 40.2 mm. Eilat, RS, Israel. 1949. A. Ben-Tuvia. SFRS: No. A 338. D. I — 25. A. 26. Filaments rather few, short and not especially distinct on body. Dorsal spine inserted close behind eye edge, similar to specimens noted below, but marked with 6 horizontal dark brown lines on pale or white membrane. Dark bar across front of snout above, with irregular small blackish marks before and large black blotch on chin. Obscure darker markings, or cloudings, and with scattered pale spots on body. On back close to soft dorsal base 2 diffuse dark grey blotches, also 2 less defined along anal base. Caudal with 3 dark transverse bands. Iris grey. (Reported as *Stephanolepis* cf. *oblongus* in Ben-Tuvia and Steinitz, 1952, p. 11).

One 59 mm. Eilat, RS, Israel. XII.1949. A. Ben-Tuvia. SFRS: No. A 60. Skin smooth to touch, scales not distinct. Scattered dermal filaments rather long. Depth $1^9/_{10}$. D. I — 24, front edge of spine smooth and along each hind edge 7 or 8 hooks bent down. Uniform dull brown, in general appearance, with obscure darker cloudings. Fins paler, with obscure or grey marks, as 3 little defined transverse bands. Along back, at bases of soft dorsal and anal, each with 2 diffuse grey blotches. (Reported as *Stephanolepis* sp. in Ben-Tuvia and Steinitz, p. 11).

One 65 mm. Eilat, RS, Israel. IV.1951. H. Steinitz. HU: No. 2074. Depth $2^1/_2$. D. I — 24, front lobe of soft fin $^3/_4$ its entire length. A. 24? Dorsal spine with thorns apically each side 5 — 5. Cirri present on body, but scattered and obscure. (Reported as *Stephanolepis* cf. *oblongus* in Ben-Tuvia and Steinitz, 1952, p. 11).

55. *Stephanolepis* **weberi** n. sp. Figure (32) type.

Stephanolepis ocheticus Fraser-Brunner: Ben-Tuvia, Bull. 8 Sea. Fisher. Res. Sta. Israel, August 1953, p. 32, fig. 19 (misidentification); Nature, vol. 172, September 5, 1953, p. 464 (Mediterranean coast of Israel).

Depth between dorsal and anal fin insertions $2^1/_5$; head $3^1/_{10}$, width $2^1/_5$. Snout $1^1/_4$ in head, its upper profile slightly concave; eye $3^1/_8$, $2^4/_5$ in snout, slightly less than interorbital. Gill opening $1^1/_2$ in eye.

Skin finely asperous, rough to touch; long patch, shaped like an isoceles triangle with its front end or apex opposite dorsal origin, broadens backwards on caudal peduncle and caudal base, with longer and more slender asperities than those on general body area.

D. I — 30, rather robust spine slightly less than snout, or $1^1/_4$ in interdorsal space, with 6 strong denticles directed down on each hind edge; second dorsal ray ends in a long filament, greatly exceeding all the other dorsal rays and but little shorter than the dorsal fin base; A. 30; caudal convexly rounded behind, $1^1/_8$ in head; pectoral $1^7/_8$, rays 13; short free tip of ventral spine with several short sharp pointed spinelets, its skinny flap behind embracing 12 flexible rays.

General colour in alcohol dull or pale brown. Eye with 3 dark radiating bars above and as many below, with traces of 1 or 2 imperfectly at hind edge. Obscure broad dark transverse blotch below front of second dorsal, with reflected blotch down on middle of side and final smaller dark blotch at forward part of anal base. Second less prominent and much smaller blotch below at hind part of dorsal and similar dark blotch reflected at hind basal part to anal. Narrow dark bar crosses caudal peduncle medially, also similar one less prominent subbasally on caudal. Caudal with 2 other transverse wider dark bands. Dorsal spine pale, with median and basal dark blotches. Second dorsal, anal and pectoral uniformly pale.

No. 72148 A.N.S.P. Haifa, MS, Israel. 5.I.1952. A. Ben-Tuvia. SFRS: No. M 523. Length 96 mm. Type.

Only the type known to us. It appears to differ markedly, as may be seen in *Stephanolepis ocheticus*, in coloration, various details of structure and proportion. The mistake was in associating it with *Stephanolepis ocheticus* Fraser-Brunner. It surely seems to approach more closely *Stephanolepis diaspros* Fraser-Brunner from the Persian Gulf, with which it may indeed prove synonymous. Not only is the second dorsal ray alone prolonged, but the greater body depth, colour pattern and various proportions differ. The figure of the holotype of *Stephanolepis diaspros* differs in having the forward dorsal rays all shorter than the median rays; the median area of the closely set and slightly larger spines extends less forward than in our specimen, with the spines indicated at least marginally directed forward, though in our specimen all are clearly directed backwards. The short dorsal spine of *Stephanolepis diaspros*, larger gill opening and small pectoral may be due to changes with advancing age.

(Named for Prof. N. A. Weber, who has presented us with interesting Iranian fishes.)

ANTENNARIIDAE

*56. *Antennarius nummifer* Cuvier?

One 11.8 mm. Eilat, RS, Israel. 25.XII.1949. A. Ben-Tuvia. SFRS: No. A 43/b. D. I — I — 12. A. 7. Very light or pale uniform brown. Fins whitish. Iris silvery. Bait not quite long as first dorsal spine and apparently ending in a small bulb. (Specimen reported as *Antennarius* cf. *nummifer* in Ben-Tuvia and Steinitz, 1952, p. 11.)

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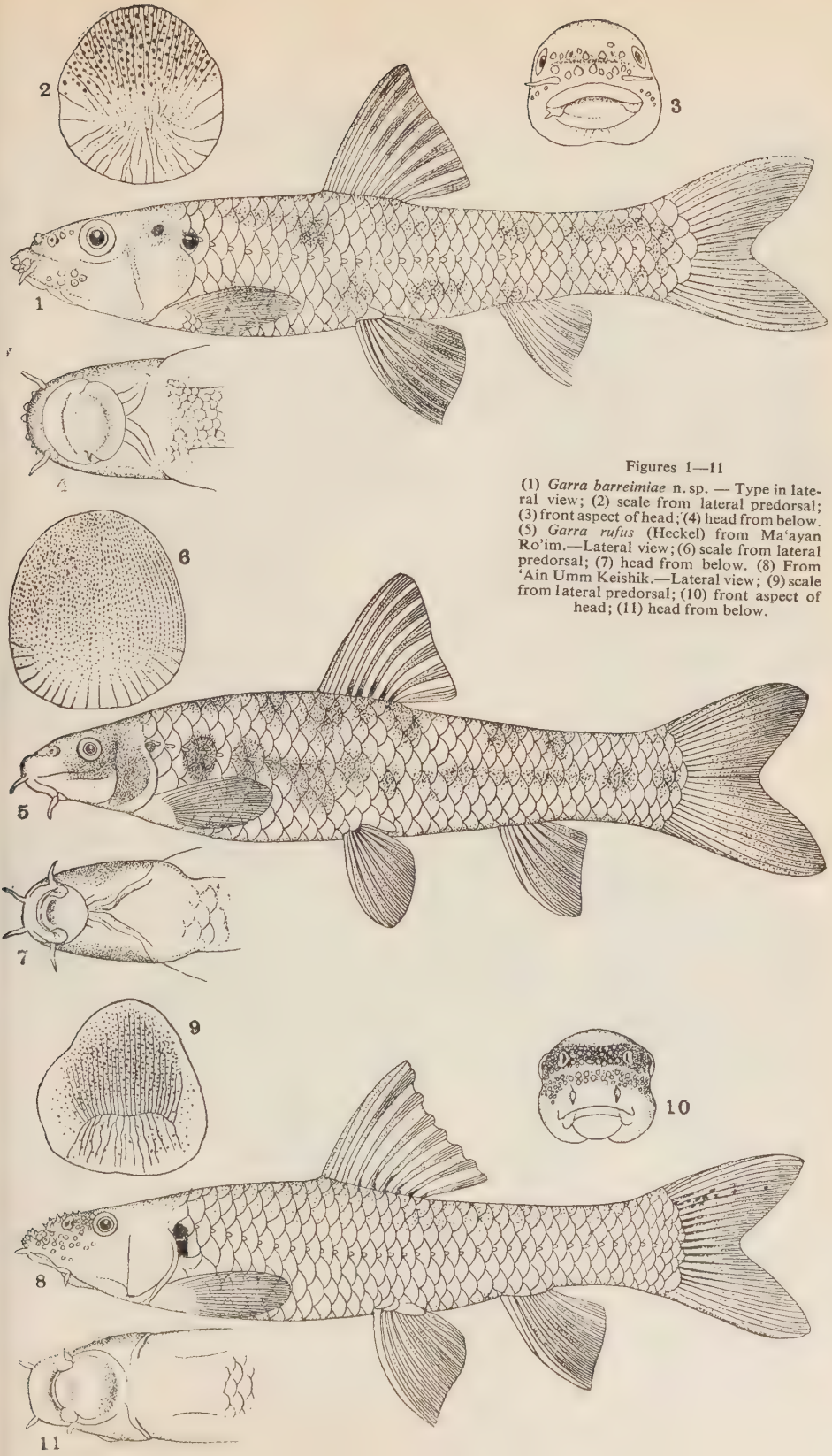
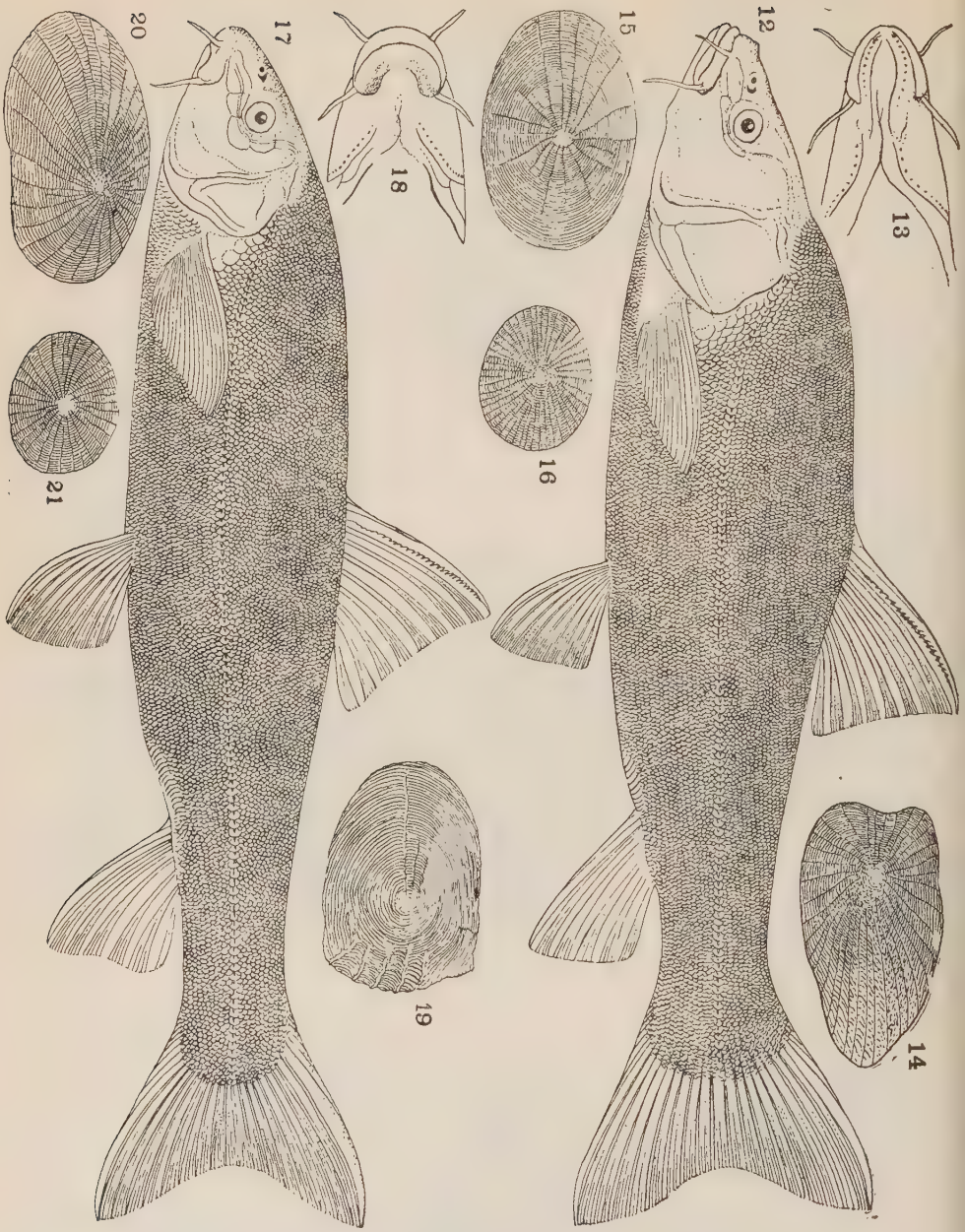


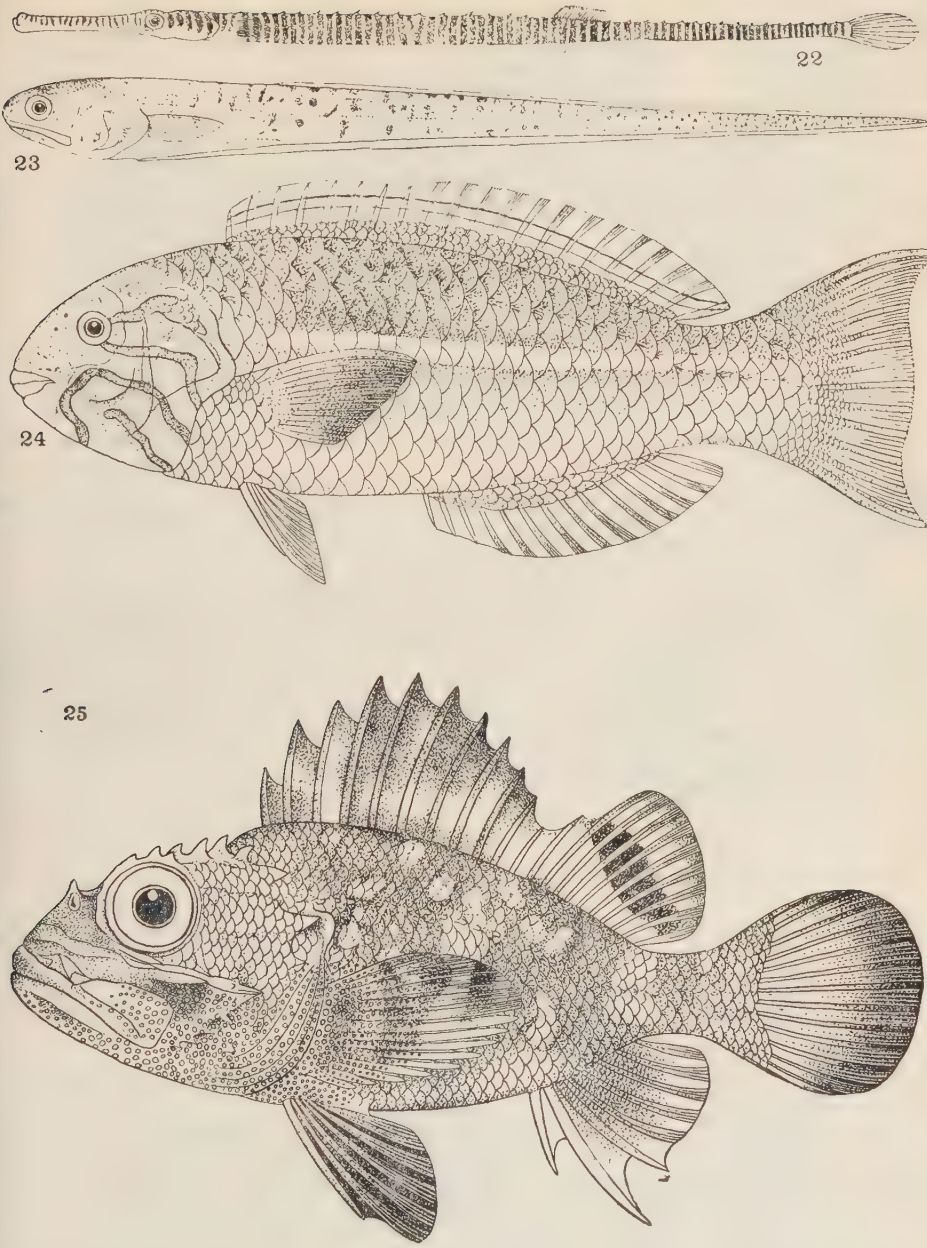
Figures 1—11

(1) *Garra barreimiae* n. sp. — Type in lateral view; (2) scale from lateral predorsal; (3) front aspect of head; (4) head from below. (5) *Garra rufus* (Heckel) from Ma'ayan Ro'im.—Lateral view; (6) scale from lateral predorsal; (7) head from below. (8) From 'Ain Umm Keishik.—Lateral view; (9) scale from lateral predorsal; (10) front aspect of head; (11) head from below.



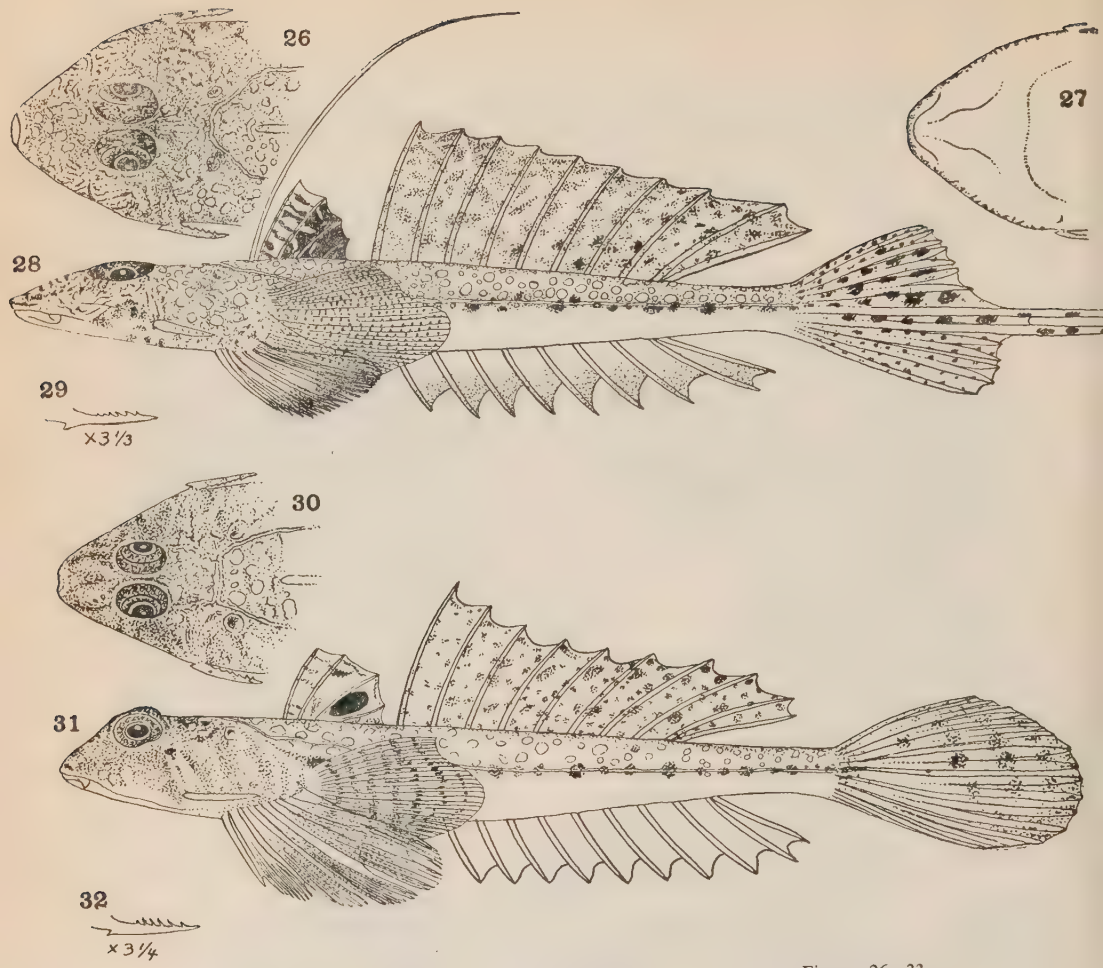
Figures 12—21

(12) *Schizothorax schumacheri* n.sp.—Type in lateral view; (13) head from below; (14) large postscapular scale; (15) small upper lateral predorsal scale; (16) preanal scale. (17) *Oreinus anjac* n.sp. — Type in lateral view; (18) head from below; (19) large postscapular scale; (20) small upper lateral predorsal scale; (21) preanal scale.



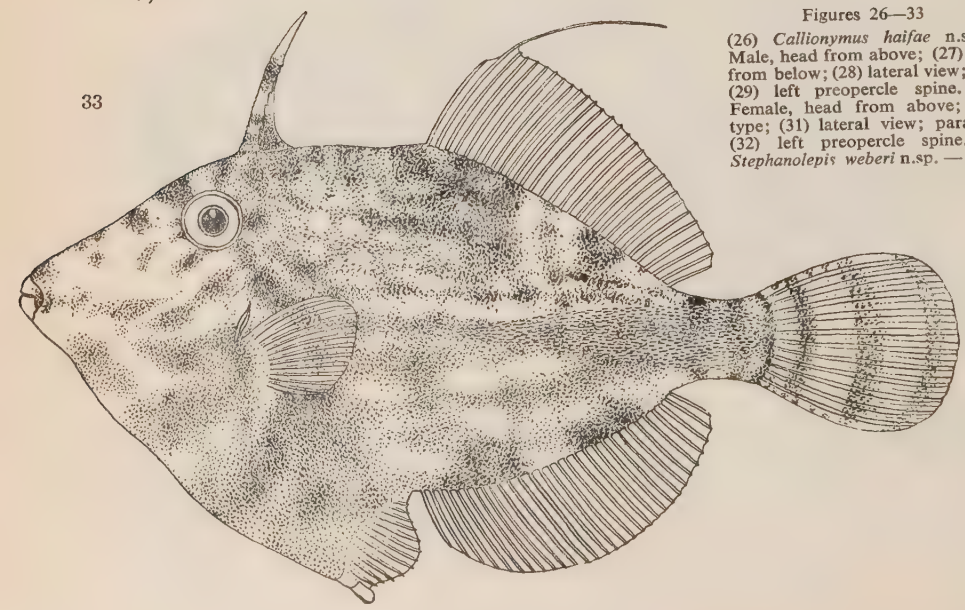
Figures 22—25

2) *Dunckerocampus ben-tuviae* n.sp. — Type. (23) *Carapus variegatus* n.sp. — Type. (24) *Thalassoma klunzingeri* n.sp — Type. (25) *Scorpaena aqabae* n.sp. — Type.



Figures 26—33

(26) *Callionymus haifae* n.sp. — Male, head from above; (27) head from below; (28) lateral view; type; (29) left preopercle spine. (30) Female, head from above; paratype; (31) lateral view; paratype; (32) left preopercle spine. (33) *Stephanolepis weberi* n.sp. — Type.



ARCHAEOLOGICAL FISHBONES COLLECTED BY CARLTON S. COON AT HOTU

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ABSTRACT

Bones of 5 well known European fresh water fishes and one marine barracuda (*Sphyraena sphyraena*) were found at Hotu, Iran, about 4½ miles from the present shore of the Caspian Sea.

The following is a report on a collection of fish bones in the University Museum, University of Pennsylvania in Philadelphia, Pennsylvania, U.S.A. I am indebted to Dr. Coon, who kindly submitted them to me for study. Listed here are only those bones which permit identification.

According to Dr. Coon, the fishbones came from Hotu Cave and Hotu, located some 100 yards from Belt Cave in an outcrop of Jurassic limestone near the village of Turujan, about 4½ miles west of Behshahr, Province of Mazandaran, Iran. These caves are about 4½ miles from the present Caspian shore. This shoreline is constantly changing; at present it is receding. Probably the sea itself cut the caves at some earlier period of high water.

Belt cave contains a series of deposits ranging from early postglacial time through the early Neolithic. It holds the oldest C^{14} date for agriculture and animal husbandry. Hotu also contains early postglacial materials, followed by a later Neolithic in two phases, softwear and painted pottery. Then another gap and early Iron Age, then late Iron Age, post-Achaemenian and pre-Islamic.

ESOCIDAE

Esox lucius Linnaeus (Figures 1 and 2)

HB 2.50—3.35. Dentary. Length 70 mm. "One specimen, early Iron."

CYPRINIDAE

Cyprinus carpio Linnaeus (Figures 3 to 15)

HB 1.70—2.50. Pharyngeal. Length 39 mm.
HB 2.00—2.50. " " 38 mm.
B 200? " " 33 mm.
No data (fragmentary pharyngeal with only 3 teeth intact). Length 30 mm.
HC 50—100. Opercle. Length 54 mm.
HB 200—250. " " 52 mm.
HB 17a—2.50. Dentary. " 54 mm.

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HB 2.50—3.35. " " 39 mm.
HB 200—240. " " 29 mm.
HA 20. " " 33 mm.
HA 28. " " 28 mm.

Unnumbered. 2.00—2.50. Preopercle. Length ?
HB 2.50—3.35. Preopercle. Length 56 mm.
HB 400 X. " " 53 mm.
HA 18. " " 42 mm.
HB 1.70—2.50. " " 53 mm.
HC 0—50. " " 37 mm.
HB 3.45— " " 47 mm.
HA 23. " " 42 mm.
B 200? " " 46 mm.
HC 0—50. " " 46 mm.
HA 25. " " 27 mm.
HB 2.50—3.35. " " 30 mm.

"Cyprinus comes from the two Iron Age horizons, dated at about 1100—900 BC and 1—700 AD."

Rutilus rutilus (Linnaeus) (Figures 16 to 18)

HA 14. Pharyngeal. Length 38 mm.
HB 630+ " " 36 mm.
HB 200—250. " " 40 mm.
HA 14. " " 40 mm.
H Surface. " (4 teeth and socket). Length 38 mm.
HA 31. " (4 teeth and socket). " 32 mm.

Berg gives the teeth for this species as 6—5, 5—5 or 6—6. The figure of *Leuciscus rutilus* (Linnaeus), as shown by Smitt (Hist. Scandinav. Fishes, ed. 2, text, t. 2, 1895, p. 773, fig. 142, pharyngeal teeth), agrees largely. Smitt says the first 2 teeth "are almost straight, blunt conical, and without hooked tip, the others strongly curved at the tip, more or less compressed in a transverse direction (back and front), and before they are worn, more or less distinctly crenulated (pectinated), the hindmost tooth, which is the least worn, most distinctly."

"Three specimens in the early Iron Age and one each from the two Neolithic horizons, in the fifth and fourth millenia." Also "one Rutilus and one Silurus were found in unstratified deposits outside."

SILURIDAE

Silurus glanis Linnaeus (Figures 19 to 25)

HC 160—0. Dorsal spine. Length 54 mm.
HB 3.45— " " 38 mm.
HB 2.00—2.50. " " 53 mm.
HA 19. " " 38 mm.

HB 170—250. Pectoral spine. Length 45 mm.
HB 200—300. " " " 50 mm.
B Br Dune 5 — r 2 — 6. Pectoral spine. Length 38 mm.

Smitt (Hist. Scand. Fish. ed. 2, t. 2, 1895, p. 697) says of the pectoral that the "first (uppermost) ray is strong and spinous, though articulated at the tip, and forms a weapon which in old specimens develops a number of spines on the inside of the outer (distal) part."

"Silurus 5 early, 1 late, Iron."

SPHYRAENIDAE

Sphyraena sphyraena (Linnaeus) (Figures 26 and 27)

HB 200—240. Dentary. Length 24 mm.

"Sphyrnaena (?) 1, early Iron."

Although the dentition of the American barracuda, *Sphyraena barracuda*, is well described and in detail by Gudger (*Sphyraena barracuda*, its Morphology, Habits and History, publ. No. 252 Carnegie Inst. Washington, 1918, pp. 53 to 108, 4 text-figs, pls. 1 to 7), it differs from any I have seen in the somewhat irregular outer row of small teeth, close-set, and closely pressed against the larger teeth basally, about 19 in number. Gudger shows the upper dentition with an outer row of small basal teeth. None are, however, indicated for the lower jaw, or are such mentioned in the description. In a skeleton of *S. barracuda* in our museum, its dentition agrees entirely with Gudger's account.

SERRANIDAE

Morone labrax (Linnaeus) (Figures 28 to 31)

HB 2.00—2.50. Opercle. Length 53 mm.
HB 3.45— " " 48 mm.
HB 3.45— " " 26 mm.
HA 400—240. Preopercle. Length 35 mm.
HC c—160 " " 52 mm.

"Morone the same as *Cyprinus carpio*."

EXPLANATION OF FIGURES

Esox lucius Linnaeus

1 and 2. HB 2.50 — 3.35. Inner and outer faces of dentary.

Cyprinus carpio Linnaeus

3 and 4. HB 1.70 — 2.50. Lower pharyngeal.
5. HB 2.00 — 2.50. Lower pharyngeal.
6. HC 50 — 100. Opercle.
7. HB 200 — 250. Opercle.
8—9. HB 2.50 — 3.35. Right dentary, inner and outer faces respectively.

10—11. HA 20. Left dentary, inner and outer faces respectively.
12—13. 2.00—3.35. Right preopercle, outer and inner faces respectively.
14. HB 2.50 — 3.35. Right preopercle.
15. HA 18. Left preopercle.

Rutilus rutilus (Linnaeus)

16. HB 630 — Lower pharyngeal, inner face.
17—18. HB 200—250. Lower pharyngeal, view from above and inner view.

Silurus glanis Linnaeus

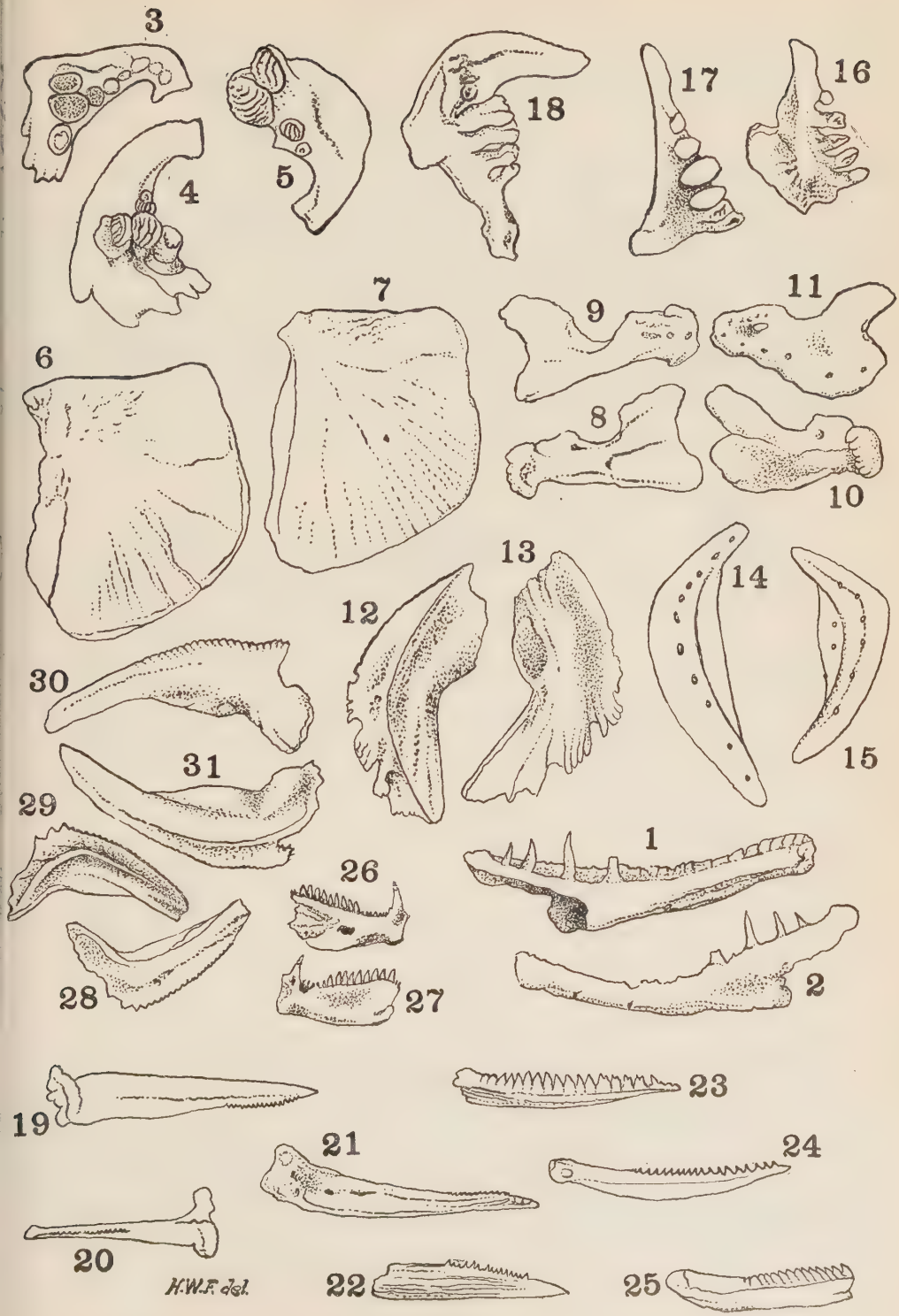
19. HC 160—0. Dorsal spine, lateral view.
20. HB 3.45 — Dorsal spine, hind view.
21. HB 2.00—2.50. Dorsal spine, lateral view.
22. HA 19. Dorsal spine terminally, in lateral view.
23. HB 170—250. Pectoral spine terminally.
24. HB 200—300. Pectoral spine terminally.
25. B Br Dune 5—r 2—6. Pectoral spine.

Sphyraena sphyraena (Linnaeus)

26—27. HB 200—240. Dentary, inner and outer faces respectively.

Morone labrax (Linnaeus)

28—29. HA 400—240. Right preopercle, inner and outer faces respectively.
30—31. HC c — 160. Left preopercle, outer and inner faces respectively.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HAEMAPHYSALIS TAURICA ORNATA N. SSP. FROM ISRAEL*

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Among four males of *Haemaphysalis* found on a hedgehog (*Erinaceus roumanicus*) on March 7, 1955 in Jerusalem, three were *H. taurica* Pos.Str. and one, though resembling the others, seems to represent a new subspecies.

This male resembles *H. taurica* except in the contour of the palps (Figure 1A, B). The third article of the palp is salient laterally. In all other aspects it corresponds to the description of *H. taurica* given in previous papers (Feldman-Muhsam 1951, 1953).

The female is unknown.

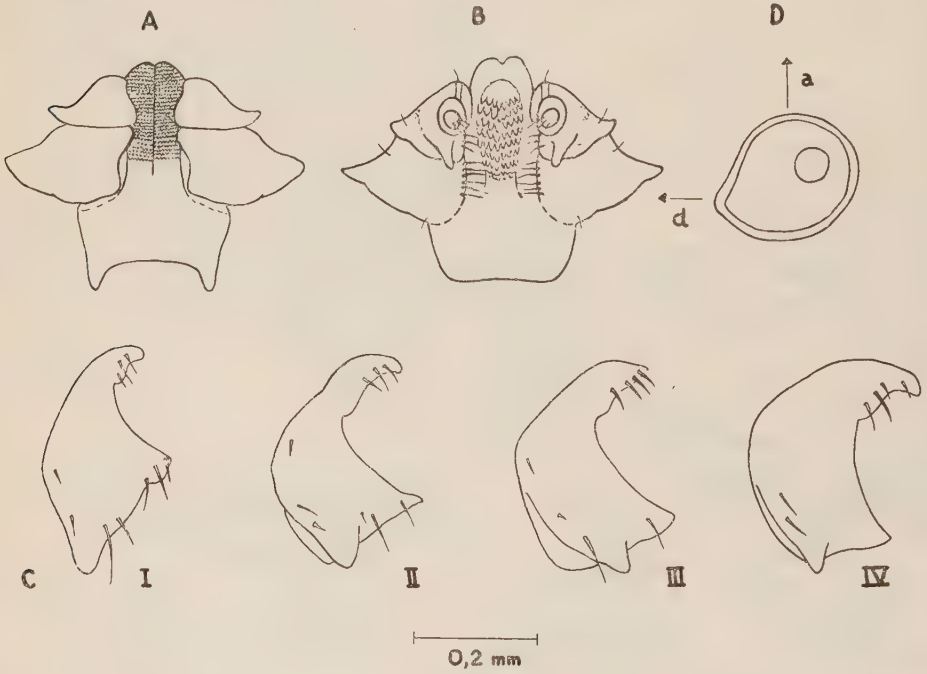

Figure 1
Haemaphysalis taurica ornata n. ssp. Type. A—Capitulum dorsum, B—Capitulum venter, C—Coxae I, II, III, IV, D—Spiraculum.

It should be noted that this tick differs from specimens of *H. taurica* found till now in Israel, in a slightly lower pilosity of the posterior coxae than normally observed; only the first coxa is as pilose as usual (Figure 1C). The problem therefore arises whether

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the new subspecies should be attached to *H. taurica* or *H. erinacei* Pavesi, the latter species differing from the former in a lesser pilosity of the coxae. A study of the specimen makes the impression that the lower number of hairs on coxae III and IV is due to wear and tear, and the higher pilosity of the first coxa is assumed sufficient evidence for considering the specimen a subspecies of *H. taurica.*

It should be mentioned in this connection that Hoogstraal's (1955) assumption that *H. taurica* and *H. erinacei* are one species is, on the one hand, substantiated by the identity of the form of the genital aperture of the type specimen of *H. erinacei* Pav. (= *H. numidiana* Nn.) and of Israel specimens of *H. taurica;* on the other hand, Pospelova Strom (1939) pointed out in her paper on the preimaginal stages of *Haemaphysalis* that there are small differences between larvae and nymphs of *H. erinacei* and *H. taurica.*

It seems, therefore, that, in view of the evidence provided by differences in the preimaginal stages, *H. erinacei* Pavesi and *H. taurica* Pos. Str. should be considered as two distinct species, unless the contrary is proved on the basis of a re-examination of type specimens or the comparison of laboratory bred specimens.

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THE VALUE OF THE FEMALE GENITAL APERTURE AND THE PERISTIGMAL HAIRS FOR SPECIFIC DIAGNOSIS IN THE GENUS *RHIPICEPHALUS* *

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ABSTRACT

An attempt is made to show that certain difficulties in identification of females of the genus *Rhipicephalus* are easily overcome by the examination of the genital aperture and the peristigmal hairs. By this method it is possible to differentiate between otherwise indistinguishable species. This method has been applied to the females of the following species: *R. capensis* K., 1844 and *R. compositus* Nn., 1897; *R. capensis* and *R. longus* Nn., 1907; *R. sanguineus* s. str. (Lat., 1806) Fel.-Muh., 1952 and *R. sulcatus* Nn., 1908; *R. pravus* Doen., 1910 and *R. bursa* Can. and Fanz., 1877; *R. supertritus* Nn., 1907 and *R. sculptus* Warb., 1912; *R. kochi* Doen., 1905 and *R. masseyi* Nut. and Warb., 1908.

At the same time *R. punctatissimus* Gerst., 1873 is shown to be a synonym of *R. sanguineus* s. str. (Lat., 1806) Fel.-Muh., 1952, and the female co-types of *R. muehlensi* Zpt., 1943 are shown not to belong to one species.

Rhipicephalus and *Hyalomma* are considered to be the two most difficult genera of the Ixodidae. Warburton (1912) mentions the extreme difficulty in the identification of females of different species of *Rhipicephalus*. He writes: "In no genus is it so dangerous to describe a new species from a single individual, especially if the specimen be a female". Zumpt (1950, p. 58) says: "The females are especially difficult and in some species they cannot be separated. Quite often it will only be possible to identify the species if males are also available . . . The present key is therefore doubtful".

There are many groups containing two or more species in which it is very difficult or impossible to distinguish between the females. The literature on Ixodidae is full of such examples.

An attempt was made to overcome this difficulty especially in the females (but also to a lesser degree in the males) by the new method of classification introduced by Adler and Feldman-Muhsam (1946, 1948) for the genus *Hyalomma*. This method, which subsequently proved useful in other genera of Ixodidae, *Haemaphysalis* (Feldman-Muhsam 1951, 1953), *Amblyomma* and *Dermacentor* (Feldman-Muhsam 1951), is also applicable to the genus *Rhipicephalus*.

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In this paper an attempt will be made to show that the female genital aperture and the peristigmal hairs are very reliable and useful characters for specific identification of females and for separating closely allied species which have hitherto been indistinguishable.

The technique of this method is as follows: A very small area (ca. 0.5 × 0.5 mm) around the genital aperture is excised and kept for 24 hours in 2% KOH. The muscles are then carefully removed from the vaginal tube with a pair of fine forceps. The material is then washed in water, dehydrated and mounted in balsam. The cleared genital aperture appears under the microscope as a "cup" with a "stem" (Figure 1). The anterior edge of the cup is the external opening of the genital tube. The lateral aspects of the cup are referred to as "flaps". Posteriorly the "cup" is continued as a long and straight vaginal tube (the "stem"). The form of the "cup" and the flaps is characteristic for the various species, and can therefore be used for their identification.

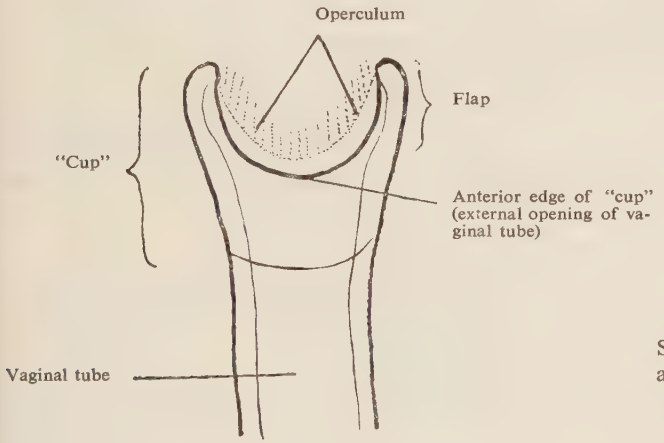

Figure 1

Schematic diagram of a cleared and mounted female genital aperture of an Ixodid tick.

In the present paper the above method is applied to several groups of species which were difficult to distinguish.

R. capensis K., 1844 and *R. compositus* Nn., 1897

The status of *R. compositus* has been debated. Zumpt (1950) considers it as a synonym of *R. capensis*, whereas Dias (1951) and Hoogstraal (1954) consider the two species distinct. It seemed advisable to clarify this issue by an examination of the genital aperture of the females.

A glance at the mounted genital aperture of the females of the two species immediately shows that the species are distinct. The genital aperture of *R. compositus* shows a large and deep cup. The entrance into the vaginal tube has the form of

a V with a round base, and the midparts of the two internal borders of the flaps are convex medially (Plate II (2)). The "cup" of *R. capensis* is about $^2/_3$ the size of that of *R. compositus*. The bottom of the opening of the "cup" is flat or almost so, and the anterior portion of the flaps is turned distally (Plate I (3)). It should be mentioned that *R. ayrei* Lewis, 1933 is considered by Dias (1951) and Hoogstraal (1954) to be a synonym of *R. compositus*, whereas Zumpt (1950) and Rageau (1953) consider it a synonym of *R. capensis*.

R. capensis K., 1844 and *R. longus* Nn., 1907

The validity of these species is generally recognized today, but Theiler (1947) and Zumpt (1950) consider *R. longus* to be a subspecies of *R. capensis*, whereas Dias (1951) gives it its original specific rank.

The females of *R. capensis* and *R. longus* are, according to Zumpt (1942, 1950), indistinguishable.

Here, again, the mounted genital apertures immediately reveal the identity of the female.

In *R. longus* the opening of the cup has the form of a V with a slightly rounded bottom. The flaps are long and have a medially protruding projection (Plate I (4)), whereas in *R. capensis* the picture is entirely different (Plate I (3)). *R. longus* should therefore keep its status of a species.

R. sanguineus Lat., 1806, *R. punctatissimus* Gerst., 1873 and *R. sulcatus* Nn., 1908

R. punctatissimus is, according to Zumpt (1950), a synonym of *R. sanguineus*, and *R. sulcatus* a punctated form of *R. sanguineus*. On the other hand, Dias (1951) thinks that *R. punctatissimus* is a valid subspecies of *R. sanguineus*, and that *R. sulcatus* should be considered a synonym of *R. sanguineus punctatissimus*. An examination of the female genital aperture of Gerstaecker's type specimen of *R. punctatissimus* and that of Neumann's type specimen of *R. sulcatus* shows without any doubt that *R. punctatissimus* is a synonym of *R. sanguineus* s. str. (Lat., 1806) Fel.-Muh., 1952, and that *R. sulcatus*, although superficially very similar to *R. punctatissimus*, is different and a valid species. This incidentally also confirms Theiler and Robinson's (1953) statement about the validity of *R. sulcatus*. The specimen which was Gerstaecker's type for *R. punctatissimus* is only a somewhat more punctated form of *R. sanguineus* s. str., such as is frequently encountered in breedings of this species.

In *R. sanguineus* s. str. as well as in "*R. punctatissimus*", the cup is wider than it is deep. The anterior edge of the cup is circular (Plate II (5)). In *R. sulcatus* the cup is as wide as it is deep, and the flaps are very broad and consequently narrow the opening (Plate II (6)).

R. pravus Doen., 1910 and *R. bursa* Can. and Fanz., 1877

According to Theiler and Robinson (1953), *R. pravus* was often misidentified by different workers as *R. bursa*. Apart from other characters, the mounted genital aperture of the female of *R. pravus* is of value for the differentiation of this species. The form of the genital aperture of *R. bursa* is entirely different from that of *R. pravus*. In *R. pravus* the flaps are thin and pointed anteriorly (Plate II (7)), whereas in *R. bursa* the flaps are thick and darker pigmented than the rest of the tube. The opening of the cup is as wide as it is deep (Plate II (8)).

The examination of ungorged and unmounted females under the high-power stereoscopic microscope shows that, besides the microscopical difference, the macroscopical picture of the genital area in the two species is also different. In *R. pravus* the entrance into the vaginal tube has the form of a narrow and deep cup and the tegument within the cup is protruding and has the form of an elliptical knob (Figure 9A). In *R. bursa* the entrance into the vaginal tube is V-shaped with a rounded base and the area within is flat (Figure 9B). In addition, there are some 9—12 long hairs anteriorly to the genital aperture of the female of *R. pravus* which are absent in *R. bursa*.

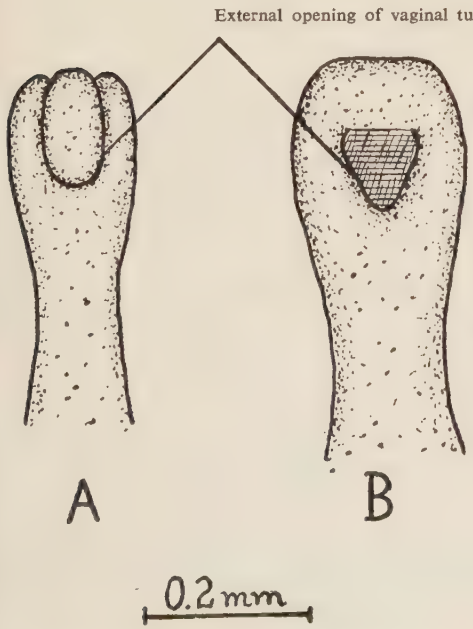

Figure 9

A camera-lucida drawing of the genital area of uncleared specimens. A—*R. pravus*, B—*R. bursa*. Dotted area—protruding area; hatched area—depressed area.

The peristigmal hairs which are present in both sexes in *R. bursa* (Feldman-Muhsam 1953) but are absent in *R. pravus*, are another good character which facilitates differentiation between the two species.

R. supertritus Nn., 1907 and *R. sculptus* Warb., 1912

According to Zumpt (1950), the females of *R. supertritus* are indistinguishable from *R. sculptus*. Here, again, the form of the female genital aperture is an excellent character for the differentiation of the two species.

In *R. sculptus* the cup is much wider than the underlying tube, and the anterior opening of the cup is wider than it is deep (Plate III (10)). In *R. supertritus* the cup is almost as narrow as the underlying tube. The cup is higher than it is broad and its anterior opening, too, is deeper than it is wide (Plate III (11)).

R. kochi Doen., 1905 and *R. masseyi* Nut. and Warb., 1908

The females of *R. kochi* and *R. masseyi* are, according to Zumpt (1950), hardly distinguishable. Again the mounted genital apertures of these females show a striking difference. In contrast to the large "cup" and its wide opening in *R. masseyi* (Plate III (12)), the "cup" of *R. kochi* is small and narrow and the anterior portions flaps are characteristically pigmented (Plate III (13)).

Zumpt (1950) suggests in the same paper (p. 75) the possibility that *R. kochi* is the highland form of *R. capensis*. This assumption is unnecessary because the two species are distinct.

R. muehlensi Zpt., 1943, *R. neavei* Warb., 1912 and *R. masseyi* Nut. and Warb., 1908

According to Zumpt (1950), the female of *R. muehlensi* is indistinguishable from *R. neavei* and, according to Dias (1950), it can hardly be distinguished from *R. masseyi*. It may be mentioned that three males and seven females from Maliwe-See (East Africa) in the Berlin Museum which were determined by Zumpt as *R. muehlensi* had previously been determined by Nuttall and Warburton (Zumpt 1943) as *R. appendiculatus*.

It was hoped that this problem could be clarified by a study of the female genital aperture. The examination of five female co-types from the Berlin Museum (no female type exists) showed that they do not belong to one species.

The cup of the genital aperture is narrow and deep in three specimens, whereas in the other two it is wide and shallow. In addition, the whole ventral tegument and peristigmal area of the latter two females are much more pilose than in the former three.

It is impossible to decide by examination of co-types only which, if any, of these specimens is in fact *R. muehlensi*, but in view of the high pilosity of the ventral tegument and peristigmal area of the male of *R. muehlensi* we are inclined to attribute the two pilose females to this species.

This problem can be definitely settled only by examining laboratory bred specimens; and in the meantime the differentiation between *R. muehlensi*, *R. neavei* and *R. masseyi* should remain pending until the identity of *R. muehlensi* is established.

R. sanguineus s. str. (Lat., 1806) Fel.-Muh., 1952
and *R. secundus* Fel.-Muh., 1952

It should be mentioned that by means of the above described method it has been possible to separate *R. sanguineus* Lat. into two distinct species (Feldman-Muhsam, 1952), i.e. *R. sanguineus* s. str. and *R. secundus*. The imagines of these species are otherwise indistinguishable at present. The validity of the two species was confirmed by differences in the pre-imaginal stages. In addition, it was shown that the adults differ in their host preferences (Feldman-Muhsam 1956).

CONCLUSIONS

The findings prove the importance of details in the structure of the female genital aperture for the systematics of the genus *Rhipicephalus*. It is therefore expected that this method will prove useful in clarifying other doubtful points in the systematics of *Rhipicephalus*, e.g. whether *R. duttoni* Nn., 1907 is a synonym of *R. appendiculatus* Nn., 1901, and whether *R. lunulatus* Nn., 1907 is a synonym of *R. tricuspis* Doen., 1906.

In addition it is hoped that it will be possible to distinguish between females of *R. simus* K., 1844 and *R. zumpti* Dias, 1950, which cannot be separated by the usual methods of classification.

ACKNOWLEDGMENTS

I wish to thank Dr. G. O. Evans, British Museum, Natural History, Prof. A. Kaestner, Director, Zoologisches Museum, Berlin, and Prof. Brizard, Ecole Vétérinaire, Toulouse, for permission to study type material. My thanks are also due to Dr. T. S. Dias, Chefe da 2a Subsecçao de Entomologia da Missao de Combate as Tripanosomiases, Mozambique, and Dr. G. Theiler, Department of Agriculture, South Africa, for loan and gift of African ticks.

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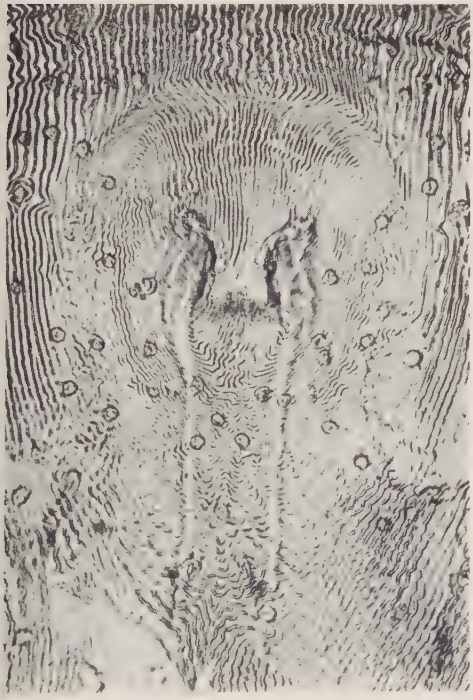
PLATE I

(2) *R. compositus* Nn. Kenya. (× 200). (3) *R. capensis* K. South Africa. (× 200). (4) *R. longus* Nn. Nyamakasama, Lake Albert-Edward. (× 200).



(4)

Forelimb regeneration in the adult aglossal anuran, Xenopus laevis (The South African Clawed Toad)

It is generally held that regeneration following limb amputation does not occur normally in post-metamorphic anurans[1–6] except in occasional instances[2,3]. In *Xenopus laevis*, however, regeneration of the toes, including claws and interdigital web, has been reported[7] but, to the writer's knowledge, forelimb regeneration in this species has not hitherto been recorded.

Preliminary experiments have been conducted on four adult *Xenopus laevis*. In three animals (two females and one male) the right forelimb was amputated approximately mid-way between elbow and wrist. In the fourth animal (a male) the most cranial finger of the left hand was amputated at its base. All amputations were made in one clean cut by means of a scissors. Both before and after operation the animals were kept in tap water at room temperature and were fed minced meat or liver usually twice weekly.

Forelimb amputation (*Figures* 1—3)

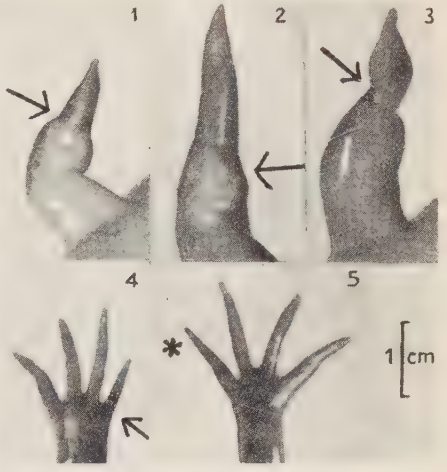
The animals have been observed for periods varying from 432 to 708 days. In all three cases considerable regeneration has taken place. When comparison is made with the unoperated forearm it is seen that in each case the tip of the regenerate has grown beyond the original site of the wrist. Pigment has appeared in all three regenerates and is similar in distribution; in the proximal part of the regenerate it resembles that of the stump but it decreases distally and is minimal towards the tip.

The form of the regenerates varies somewhat from case to case. In all instances one or more longitudinal grooves of various lengths are present; in one case (♂1) the whole regenerate has a flattened appearance and in one other case (♀2) the tip is distinctly flattened.

X-ray examination shows the presence of bone in the proximal part of one regenerate only (♀1). This case has been observed for a longer period than the others.

Finger amputation (*Figures* 4—5)

The regenerate has reached a length of 6.0 mm 109 days after amputation. The length of the equivalent finger of the opposite unoperated hand is 9.5 mm. In form and colour the regenerate closely resembles a normal finger. X-ray examination shows no bone formation.



Figures 1—5

Forelimb regeneration in *Xenopus laevis*. Arrows indicate the original sites of amputation.

1—3. Amputation through forearm. Ventral aspect.
(1) ♀1 (708 days after operation).
(2) ♀2 (444 days after operation).
(3) ♂1 (432 days after operation).
(4) Amputation of finger of left hand (♂2). Dorsal aspect (309 days after operation).
(5) Right hand of ♂2. The asterisk marks the finger equivalent to that which was amputated in the left hand.

In considering why such extensive regeneration should occur in *Xenopus laevis* as compared with other Anura it may be of significance that *Xenopus* normally never leaves the water; the possibility that a watery environment is more conducive to regeneration has been considered by a number of workers[3,6]. It is also of interest that the aglossa have been regarded by some as the "lowest Anura"[8,9]. According to Paterson[10], they present some striking morphological similarities with aquatic Urodela on the one hand and with certain genera of the Phaneroglossa on the other. The latter generally do not regenerate their limbs, whereas the Urodela generally do.

Regarding the form of the regenerates, it is possible that the flattening seen in two cases and the longitudinal grooves noted in all the forearm regenerates may represent signs of hand and finger morphogenesis. An answer may be provided by the subsequent progress of the regenerates and by their histological appearances.

I wish to thank Dr. S. Schorr for the X-ray examinations, Mrs. H. Weinmann and Mr. P. Herzog for the photographs and Mr. Isaac Hayoun for technical assistance.

After this letter had been submitted for publication my attention was drawn to the work of Gallien and Beetschen[11] and Beetschen[12] who obtained results similar to my own.

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On the occurrence of Stenodactylus petrii and Stenodactylus (Ceramodactylus) doriae in Southern Israel

The desert gekkonids *Stenodactylus petrii* Anderson and *S.* (*Ceramodactylus*) *doriae* Blanf. are rather similar in their habitus, and a clear statement about the morphological differences between the two species is advisable.

S. petrii, first known from Egypt (type from Tel el Amarna), has been reported from Algeria, Tripoli (Werner's *S. stenurus*, a synonym), Cyrenaica, Libya and Oran, but also from Sinai (Kantara). Barbour's *S. elimensis* should be referred to this species, too, according to Loveridge[1].

Stenodactylus petrii	*Ceramodactylus doriae*
Nasal area not swollen	Nasal area strongly swollen
Nostril excluded from rostral	Nostril bordering on rostral
No anal pores at all in both sexes	2 anal pores (3, one being median, in one specimen) in both sexes
Abrupt tail constriction, tail with extremely fine terminal lash	Tail constriction rather gradual, no fine endlash at the terminal part of the tail
A strongly developed paired cluster of enlarged conical scales at the base of the tail	The cluster is much less developed, the conical scales being smaller and less prominent
The marbled diffuse darkenings of the back enter the tail — no transverse bands	Tail transversely banded in blackish colour, marbled diffuse darkenings on back
No pronounced collar constriction	Collar constriction well pronounced (half of maximal width of head)
The scales on the underside of the fingers and toes show a medial tricarinate, transversely enlarged series throughout the length of the digits, accompanied on either side by 2 series of fringed scales	Same arrangement of 5 series of scales on under surface of digits, but the medial series is only distally well developed and relatively much narrower than in the other species; proximally, all 5 series are of equal width, but the medial series is feebly tricarinate as in *petrii*
Conical denticulations on posterior part of upper eyelid	No conical denticulations on upper eyelid

The type comes from Wadi Gharandal, Sinai. Two specimens are so far known from Israel, one (R574) from Revivim (Bir Asluj) on the Beersheba—Kantara highway, and the other (R1265) from Dangur, not far from Gaza. Both specimens are males. This double record extends the eastward range of the species considerably.

M. Guibé of the Muséum National d'Histoire Naturelle, Paris, kindly lent me a series of 9 specimens: 4 from Algeria and 5 from the Sahara (triangle between Ouargh, El Golea and Ghardaia).

Another specimen from the Algerian Sahara was kindly given to me by the British Museum (N.H.).

A series of *Ceramodactylus doriae* (8 specimens from Ein Ghadian, southern Wadi Araba, and another from the Wadi Menaye area) could be studied and compared with the first species.

Flower[2] is the only author who mentions *Ceramodactylus* as probably occurring in Wadi Araba (p. 759: "*Ceramodactylus doriae* has been reported to occur in Sinai by G. A. Boulenger[3] (p. 13) from one specimen from H. C. Hart, but it is not certain that Hart obtained this in Sinai it appears probable that he collected it in the Wadi Araba (South-East Palestine or North Arabia), but the species may occur in Sinai.").

This species is recorded from Persia ("one march from Bandar Abbas on the road to Karman"; the type is described by Blanford[4], p. 352 ff.; Tanjistan and different parts of Arabia (Aden, Hadramaut, Muscat, etc.).

We thus see that both species meet but do not overlap in Southern Israel, the mostly North African *S. petrii* reaching two places at the south-western border of Israel, and the Arabian and Persian *C. doriae* penetrating into the southern part of Wadi Araba.

The following unequivocal differences could be found between the two species:

Ceramodactylus doriae is somewhat intermediate between other Ceramodactyli and certain Stenodactyli, in showing a faint indication only of a special median series of tricarinate scales on the underside of the digits, differing in width from the other ventral scales, and manifest at the distal ends of the digits only.

Anderson[5] therefore proposes to abolish the genus *Ceramodactylus* altogether and to accord to it subgeneric rank only. Other Ceramodactyli (*maior*, e.g.) do not have an enlarged medioventral series of scales along the soles of the fingers and toes. All ventral scales should be equal in this genus. Anderson is certainly right in stating that the gap between the two genera is rather a gradual one, with clear-cut extremes and several intermediate steps. Both *C. doriae* and *S. petrii* are rather close to the "border line", and have therefore caused much confusion among the taxonomists.

I wish to express my thanks to Dr. H. Mendelssohn, Tel Aviv, for lending to me his series of *Ceramodactylus doriae* from Ein Ghadian and two specimens of *Stenodactylus petrii*.

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PROCEEDINGS

OF THE

SECOND MEETING

OF THE

ISRAEL GENETICS CIRCLE

HELD AT JERUSALEM, APRIL 4, 1956

CONTENTS

A homoeotic mutant of Drosophila. ADA LEDERMAN-KLEIN, *Department of Zoology, The Hebrew University of Jerusalem.* A mutant stock of *Drosophila melanogaster*, for which the name *ophthalmoptera*' is proposed, shows prominent outgrowths from the optic region, resembling wings or halteres. The stock had been produced in this laboratory by continued backcrossing of eyeless[2] flies to the strain 'Berlin' and by subsequent selection of homoeotic mutants among the eyeless flies. (Morgan and coworkers[1] mention a similar abnormality as an occasional freak in eyeless cultures, but apparently never obtained it in appreciable numbers for analysis.)

After selection of over 30 generations, penetrance of the homoeotic change had reached a plateau, and thereafter, in spite of continuous selection of over 20 generations, fluctuated between 70 and 95%, without achieving any permanent progress. The number of affected flies rises as the culture ages and expressivity increases at the same time from small bulges to large inflated protrusions reaching a volume up to half that of the head capsule.

For embryological experiments it was considered essential to devise culture conditions, which would favour maximum penetrance and expressivity. These could be shown to vary with external factors as well as with maternal age. On dry medium significantly more affected flies appear than in ordinary moist bottles. Crowding, on the other hand, produces no marked effect.

Females two days after eclosion yielded 64.1 $\pm$ 3.5% affected offspring. At five days maternal age 77.3 $\pm$ 1.3% affected flies were produced, while 80.6 $\pm$ 2.6% homoeotic mutants hatched from the eggs of females nine days old.

It could be shown that the melanotic spots appearing on the outgrowths increase in number and size during the adult life of the flies. Many of these spots appear to be due to injury resulting in internal hemorrhage and blocking of the blood flow.

I am grateful to Dr. E. Goldschmidt for providing the selected mutant stock, and for her guidance in this work.

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The salivary gland chromosomes of the Simuliidae. RUTH ZIMRING, *Department of Zoology, The Hebrew University of Jerusalem.* In 1951 a cytotaxonomic survey of the Simuliidae in Eastern Canada was begun in the Department of Botany, University of Toronto by Dr. Klaus Rothfels[1,2]. The following year I took up the study of a group of 11 *Simulium* and *Eusimulium* species in the above laboratory.

It has long been known that the Simuliidae have salivary gland chromosomes favourable to study; certain striking features make them especially amenable to cyto-taxonomic analysis. These gross characters can be used in distinguishing the species and may eventually serve in defining larger segregates. The following were discussed: arm ratios, degree of pairing of constituents, nature of the centromeric regions, position of the main nucleolus and of the Ring of Balbiani and certain inflated regions termed "bulges".

The main nucleolus is especially interesting and taxonomically useful on account of its "mobility". This phenomenon was illustrated in a series of idiograms.

In certain instances banding pattern was studied in detail, as for example in the untangling of complex rearrangements, which resulted in evidence of the non-randomness of breakpoint distribution. Also it was found that ends and regions adjacent to centromeres tend to be preserved through long series of species and make good taxonomic characters.

Several of the segregates hitherto regarded as single species were found to contain two or more genetic isolates, i.e. sibling species. One of these, *Simulium tuberosum*, is outstanding, not only because it includes four (or possibly five) siblings, but because in three of these, sex determination is associated with the band sequence of one of the arms, and further, the arrangements in this arm differ from sibling to sibling. A similar situation was found in *Prosimulium hirtipes*.

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Some observations on crossing-over and non-disjunction in Drosophila. R. FALK, *Department of Zoology, The Hebrew University of Jerusalem.* Schultz and Redfield[1] proposed a hypothesis to explain the findings of interchromosomal interference in crossing-over and disjunction, according to which the disturbance happens during zygotene-pachytene in one of two possible ways: (a) "mechanical", as through the addition of chromosome arms to the nucleus; (b) "physiological", through some specific activity of the heterochromatin. It seemed that it would be possible to distinguish between these two alternatives by studying the XXY and related genotypes.

It was attempted to obtain some more evidence in favour of Bridges'[2] or Cooper's[3] theory on non-disjunction in the XXY females. As practically no distal crossing-over was found between the two X's in such females, Bridges' theory was discarded and Cooper's favoured. Consequently no correction is required when calculating crossing over values in such females.

Experiments were designed to test the hypothesis that attachment of parts of the Y-chromosome to the X-chromosome is mechanically less disturbing than a free Y-chromosome.

Crossing-over and disjunction values were determined for different combinations of the Y-chromosome or parts of it as free chromosomes or attached to the right arm of the X-chromosome. It appears that in all combinations the increase of crossing-over values was of the same degree. The action appears to be like an "all or none effect" of Y-chromosome heterochromatin and supports the theory that the interchromosomal interference is of the "physiological" nature. The secondary non-disjunction results are in agreement with Cooper's theory: the greater the "affinity" of the X-chromosome to the Y-chromosome the higher is the proportion of secondary non-disjunction, and vice versa.

Clusters of detachments found in a search for attached-X detachment indicate that this event is a mitotic one.

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Studies on X-ray induced viability mutations. R. FALK, *Department of Zoology, The Hebrew University of Jerusalem.* Viability mutations are no doubt relatively abundant. Many workers are dealing with different aspects of the problems of such viability mutations.

In order to learn about any relations between the degree of dominance and the detrimentality of such mutations it is necessary to study them individually. The subvital mutations studied in the present investigation were induced in an isogenic stock by X-ray irradiation of 2000 r. Viability mutations on the X chromosomes were avoided as these chromosomes may be better buffered against the induction of mutations. Third chromosome mutations only were studied. In the experimental stocks all chromosomes except the third were replaced by the non-irradiated chromosomes of the isogenic control stock. Hatchability was used as a measure of viability, and thus it was possible to study the effect of the mutations in the homozygous as well as in the heterozygous flies. These objects were achieved through a special crossing scheme and a test for hatchability. The third chromosomes of each of 47 experimental stocks were tested and the hatchability of eggs laid by 3—8 females during 5 days was determined.

As many experimental stocks were lost before they could be tested, only lethal and part of the subvital mutations were left. Among those tested the subvitals were about 3.5 times more abundant than the lethals. 73% of the tested chromosomes carried lethal or subvital mutations. The mutations with the lesser detrimental effect were the more frequent ones. In at least 1/3 of the mutations the effect was partially or completely dominant. The theoretical expectation that the more detrimental mutations are the less dominant ones could only partly be confirmed.

Experiments now in progress are planned to complete these studies and investigate the correlation between hatchability and other viability components. In other experiments it was shown that the compensation factor observed by Stern et al.[1] can be avoided when flies are cultured under not over-populated conditions. Another aspect under study is the detrimental effect of the mutations in different heterozygous combinations.

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About the relation between length of gestation period and frequency of retained afterbirth in the Bovinae. P. COHEN, *Tel Adashim.* A comparison was made between gestation periods preceding normal birth (n.b.) and those preceding births with retained afterbirth (r.a.). There seemed to be

a distinct influence of length of gestation period (l.g.) on frequency of r.a. Therefore factors that affected l.g. were first investigated. It was found that the sire was a potent influence in determining l.g. (1) This influence becomes manifest in the average length of intra-uterine life of the calves sired by him. (2) It also expresses itself in the average gestation time of the dams descended from him. The means of l.g. of 14 bulls of the Artificial Insemination Centre "On" varied between 274.71 and 283.85 days. The extreme values of the variances were 13.72 and 29.94. On account of this strong influcene a comparison was made between gestation periods of r.a. and n.b. after equalizing the number of n.b. to the total of r.a. by a reduction factor of the n.b. for every bull. The distribution of n.b. and r.a. over 8 groups of different l.g. was now compared. The first group contained all births after a gestation period from 264—267 days and so on till 289—291 days. The distribution of 290 cases of r.a. differed in a highly significant way from the distribution of 290 cases of n.b.: 22.4% of the cases of r.a. appeared after a gestation period of 264—272 days, whereas normal births in the same period amounted to only 13.1%. From the 273rd—284th day these percentages were 62.8 and 75.9, respectively. After the 284th day there was again a relative increase in the cases of r.a.: 14.8% r.a. against 11.0% n.b.

Further data about these 580 cases: Mean and Variance for r.a.: 277.59 and 37.86. Mean and Variance for n.b.: 278.16 and 25.51. The variance for r.a. is highly significantly larger than for n.b. ($F = 1.48^{**}$).

From all these data it may be seen that shorter and longer gestation periods are accompanied by an increased frequency of r.a. Thus (1) the influence of the bull on gestation length and (2) the influence of gestation length on frequency of r.a. are made highly probable.

Regarding the influence of season and age of cows on r.a. it may be stated that spring and first and second calvings have a higher relative incidence of a.r. than autumn and later calvings. A practical conclusion from this investigation is that it it seems possible to lower the percentage of r.a. to some extent by avoiding the coincidence of different predisposing factors (such as genetic influence and spring calving).

An experiment on the enzymatic basis of the phenocopic effect produced by silver nitrate. D. RAFFE, *Department of Zoology, The Hebrew University of Jerusalem.* Flies which are grown on food containing silver nitrate exhibit a number of phenocopic modifications, especially the well known deficiency in melanin pigmentation, which has been compared to the mutation *yellow*[1].

Since it is known that melanin is produced by an enzymatic system acting on tyrosine, it was the aim of the present experiment to test the effect of silver nitrate on this system in vitro.

If a prepupa is squashed in a drop of tyrosine solution (1 : 5000) on a slide, the drop darkens rapidly under the influence of the haemolymph, much more so, in fact, than either tyrosine alone or a larva squashed in distilled water. When a pupa grown on silver nitrate medium is employed in this test the darkening of the drop is much delayed.

A better demonstration of this reaction can be obtained by a "pseudochromatographic" method. Single prepupae are squashed on a sheet of filter paper Whatman No. 1, 15mm above the lower margin. The paper is rolled into a cylinder and dipped into a tyrosine solution standing 5mm high in a dish. The dish is introduced into a glass cylinder and the latter is sealed with vaseline. When larvae grown on normal medium are employed, a dark streak will develop above the start point as the tyrosine solution rises. The grey colour deepens to blackish in the course of three hours and becomes even darker within one day. The spots remain unchanged after drying and the papers can be kept indefinitely for reference. In order to test the effect of silver nitrate on this colour reaction, the paper is soaked in a 0.005% solution of silver nitrate and dried in the dark before squashing the larvae on the start points.

Results: (A) After three hours the colour reaction appears definitely inhibited on silver nitrate paper. In most cases the dark streak is absent; the area where it should appear is surrounded by a pinkish halo, apparently due to some reaction of silver nitrate with the haemolymph.

After twenty four hours the streak has usually darkened to grey but it is still much lighter than that of the control. It would appear, therefore, that the inhibition of the oxidative reaction by silver nitrate is not complete. In spite of keeping conditions as constant as possible, some prepupae will produce darker streaks on silver nitrate paper than others.

(B) Prepupae which have developed on medium containing 0.05% $AgNO_3$ produce no streak at all or, occasionally, a very pale one, when squashed on *untreated* paper. These "pseudochromatograms" are practically identical with those of control larvae squashed on $AgNO_3$ paper.

(C) Prepupae of the mutant strain *yellow* squashed on untreated paper produce streaks as dark as those developed from wild type larvae. This result is in agreement with the conclusions of Graubard[2] who demonstrated, with a different method, that the mutant *yellow* is not deficient in tyrosinase.

Conclusions: It appears that silver nitrate disturbs melanin formation by inhibiting one (tyrosinase?) or several enzymes concerned in the oxidation of tyrosine and its derivatives. This inhibition is paralleled by the known action of silver ions on potato tyrosinase, which is inactivated by Ag.

While the phenocopic effect of silver thus depends on a blocking of this oxidative reaction, the mutant *yellow* appears to be disturbed in a different step of the melanin forming system.

I wish to thank Dr. E. Goldschmidt for her help and guidance in this work.

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Chromosome races in the genus Acomys (Rodentia: Murinae). A. Zahavi and J. Wahrman, *Department of Zoology, The Hebrew University of Jerusalem.* The evolutionary relationship which might exist between *Acomys cahirinus* and *Acomys russatus* has been reported previously[1]. The karyotype analysis suggested that both species posses a similar amount of chromatin in spite of a great difference in chromosome numbers, the diploid set comprising 38 chromosomes in the former and 66 in the latter species. Recently another race of *Acomys*, from Cyprus, became available for study. This form was considered by Bate[2] as a distinct species but it is currently regarded as the sub-species *nesiotes* of the widely distributed *A. cahirinus* complex[3]. Both forms are actually very similar from the morphological point of view and also display the same chromosome number. The XY bivalents are alike in shape and size in all the three forms of *Acomys* studied thus far.

A careful analysis revealed, however, that the two 'sub-species' of *cahirinus* differ in the morphology of some of their chromosomes. No perfect agreement in the number of chromosome arms could be established and a simple Robertsonian relationship between these closely allied forms is therefore unlikely. In *A. cahirinus cahirinus* 32 large metacentric autosomes and 4 very short elements of uncertain morphology constitute the diploid autosome set; whereas in *A. cahirinus nesiotes* there are 30 metacentric autosomes, 4 acrocentric autosomes (one pair of which is of about the same size as the larger metacentrics) and only two short chromosomes similar in appearance to the small elements of the former race (Table I). These slight differences can be demonstrated in most mitotic and meiotic stages but are especially clear in second metaphase plates which are particularly favourable for analysis in species of this genus.

TABLE I

	Origin	2n male	Autosomes meta-centric	acro-centric	short	arms*
Acomys cahirinus cahirinus Desmarest	Israel	38	32	—	4	68—72
Acomys cahirinus nesiotes Bate	Cyprus	38	30	4	2	66—68

*The exact number of arms depends upon the position of the centromere in the short elements which cannot be definitely ascertained at present.

The differences between these karyotypes can probably be accounted for by structural rearrangements such as pericentric inversions or translocations. It is hoped that the examination of hybrids which are raised in this laboratory will contribute to an understanding of the relationships between the chromosomes of these races.

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Structural polymorphism in the Israel race of Drosophila subobscura. Elisabeth Goldschmidt, *Department of Zoology, The Hebrew University of Jerusalem.* Structural polymorphism in European populations of *Drosophila subobscura* is reported to be so extensive that homozygous individuals are of rare occurrence, but there is little evidence of geographic race formation based on chromosomal structure.

A population of this species from Qiryat 'Anavim (Q.'A) in the Judean Hills was studied. The common chromosome orders of the area were investigated in hybrids between the Standard (Küsnacht) and the local race. A quantitative analysis of intrapopulational heterozygosity was based on 230 larvae, each of which was derived from a different

emale caught in the wild. *D. subobscura* is a alaearctic species, and in Israel it probably pproaches the southern limits of its distribution. According to Da Cunha and Dobzhansky[1] uch a 'marginal' population should exhibit a maller variety of structural types and a lower verage heterozygosity than flies from the centre f the distribution area. This expectation was not orne out by the facts.

The population of Q. 'A. contains 26 different nversions (Table I), and its chromosomal varia- ility thus exceeds that of any European popu- ation analysed by Stumm-Zollinger[2]. Five f these inversions are described for the first time nd an additional one is distinguished from others, vith which it had been confounded. The average ate of inversions per female of the Q. 'A. popu- ation amounts to 3.3 and this figure lies well vithin the range of variation exhibited by Euro- ean populations of the species (2.4—4.8). Com- lex configurations involving from two to five nversions are predominant, and the upper limit f inversion concentration per individual (11) is igher than in most European localities. There re, on the other hand, 16% completely homozyg- us individuals.

The strain of Q. 'A. is differentiated, in everal respects, from European races of the pecies. The Standard orders of the autosomes, hich are common in Central and Western urope, are rare or absent at Q. 'A. Coadapta- on in the Q. 'A. population depends largely on nversion types, which are scarce or absent in urope. The Israel race is further characterized y the markedly unequal contribution of the five ng elements to overall polymorphism. The X- and e O-chromosomes contribute only 12% between em, while the E-, J- and U-elements are res- nsible for the remaining 88%. Although the -chromosome carries the richest store of versions (9) it accounts for only 7% of the tal polymorphism.

Coadaptation of the gene complexes at Q. 'A. nforms to the rules established by Wallace[3,4], termediate members of a 'triad' of orders ing usually rare or absent. The chromosome gions isolated in the prevalent heterozygotes e comparatively large and in some configura- ns nearly one half of the element is prevented m crossing over.

The material from Q. 'A. furnishes additional idence for the non-randomness of breakpoints *D. subobscura*. Of all the inversions first alized in the present study, only one involves o new break regions. The inversion J_3 differs from the previously known J_1 by only 4—6 bands. The existence of two independent, but almost identical inversions cautions against the orthodox procedure in chromosome phylogeny, which ascribes the origin of each inversion to a unique evolutionary event.

TABLE I

List of inversions found at Qiryat 'Anavim
(Break-points and chromosome order are indicated for new or previously not localized inversions. For data on other inversions cf. Kunze-Muehl and Sperlich[5]

Inversion	*Localization*	*Superimposed on*
A_1		
A_2		
J_1		
J_3	$21D_4$ — 25A	ST
J_4		
U_1		
U_2		
U_6		
U_7		
U_3 (Undine)	52B — 50B	$U_1 + U_2$
U_5	41A — 48A	U_1
E_1		
E_2		
E_8		
E_9		
E_{12} (Eva)	61A — 67A — B	$E_1 + E_2 + E_9$
E_3	64E — 67D	$E_1 + E_2 + E_9$
O_1		
O_3		
O_4		
O_2		
O_5		
O_7		
O_{13}		
O_{18}	85C — 90A	$O_3 + O_4$
O_{20}	79C — 85C	$O_3 + O_4$

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The rate of consanguinity in the communities of Israel. ELISABETH GOLDSCHMIDT and A. RONEN, *Department of Zoology, The Hebrew University of Jerusalem.* Consanguineous marriages tend to increase the number of homozygotes for any given gene beyond the value expected under a system of random mating. The production of a higher rate of individuals affected by a double dose of deleterious recessive genes may be considered an anti-eugenic effect of inbreeding. It should be noted, however, that the same process exposes the lethal and near-lethal recessives to natural selection and thus tends to speed up their elimination from the population.

Jewish communities are generally held to be highly inbred, but reliable figures on their con-

sanguinity are scanty. Since the different ethnic groups of Jews assembled in this country may be on the verge of a rapid merging process it is essential to gain information on the present rate of consanguinity within these groups. While it seems unlikely that even the larger ethnic units will preserve their integrity, there can be little doubt that smaller isolates will break up completely.

In a survey, which is under progress, information on random samples of the different communities is collected by questioning mothers of newborn babies in the maternity wards of the general hospitals. (A bias may be introduced by the fact that mothers of still-births will often be removed from the general wards). Notes are taken on consanguinity between the woman and her husband and, as far as may be ascertained, on cousin marriages in the preceding generations. The result furnishes a *minimum* estimate of the consanguinity in the various samples (cf. Table I).

TABLE I

Percentages of consanguineous marriages in the different communities

Origin of parents	*No. of families*	*% First cousin marriages and closer relationships*	*% Total consanguineous marriages including first and second cousins and more distant relationships*
Total Ashkenasic parents of identical origin	289	2.1 ± 0.8	4.6 ± 1.2
Ashkenasic parents of non-identical origin including Israel-born	379	1.0 ± 0.5	1.8 ± 0.7
Total Ashkenasim	679	1.5 ± 0.4	3.0 ± 0.7
Iraq	221	18.1 ± 2.6	26.7 ± 2.9
Yemen and Aden	84	10.7 ± 3.4	21.4 ± 4.4
Greece, Turkey and Bulgaria	60	5.0 ± 2.8	11.6 ± 4.1
Morocco	68	8.8 ± 3.4	14.7 ± 4.2
Persia	60	16.6 ± 4.8	20.0 ± 5.1
Other non-Ashkenasim of identical origin	179	7.8 ± 2.0	13.4 ± 2.5
Total non-Ashkenasim of identical origin	672	12.2 ± 1.3	19.3 ± 1.5
Non-Ashkenasic parents of non-identical origin including Israel-born	340	2.6 ± 0.9	3.8 ± 1.0
Total non-Ashkenasim	1012	9.9 ± 0.9	14.1 ± 1.1
Marriages between Ashkenasim and non-Ashkenasim	94 (= 5.3 ± 0.53 %)		
Total families investigated	1785		

While Reutlinger[1] estimated the rate of first cousin marriages in a community of German Jews at 16.2±3.4%, our estimate for Ashkenasic parents from identical countries of origin is much lower. When including Ashkenasic parents who came from different countries there results an overall rate of consanguinity for Ashkenasim which is only about three times as high as the rate determined by Bell[2] for England.

Among the non-Ashkenasic groups we obtain, on the whole, much higher estimates. This is true in particular of Jews from Iraq, who constitute so far the largest single sample. For some individual propositi of this group we have calculated inbreeding coefficients as high as 0.13. As in the case of Ashkenasim, the overall consanguinity of non-Ashkenasim is much reduced by the inclusion of parents whose countries of origin are not identical, and of those couples of whom one or both partners were born in Israel. It should be understood, however, that the term "non-Ashkenasim" denotes an ethnically heterogeneous group, and that the meaning of overall estimates in general is very restricted since the sizes of the various samples do not reflect the true proportions of the different ethnic groups in the population of Israel.

This first summary has thus produced evidence of the existence of numerous isolates with high rates of consanguinity. At the same time it supplies a very rough indication of the extent of the merging process which is already at work, reducing overall consanguinity within each ethnic unit. An interesting by-product of this survey was an estimate of a 5% intermarriage rate between Ashkenasim and non-Ashkenasim.

Estimates of consanguinity rates are prerequisities for the calculation of the frequencies of rare recessive genes.

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Tumour resistance to antibody response. M. FELDMAN, *Department of Experimental Biology, The Weizmann Institute of Science, Rehovot.*

The role of Robertsonian changes in the chromosomal evolution of animals. J. WAHRMAN, *Department of Zoology, The Hebrew University of Jerusalem.*

Chromosome numbers of some male Geckos (Reptilia: Gekkonoidea). Y. L. WERNER, *Department of Zoology, The Hebrew University of Jerusalem.* The karyotypes of eight species of Gekkonoidea (as defined by Underwood[1]) have been described by previous workers (cf. Makino[2]). The present investigation deals with seven out of the eight species of Gekkonidae native to Israel, and it is based on several males of each species. Specimens were collected mainly in Jerusalem and in the southern parts of the country, but the study of *Cyrtodactylus kotschyi orientalis* comprises material from Galilee as well.

In addition single males of two foreign forms have been studied: the Australian *Oedura lesueurii*, which had been obtained through the courtesy of Mr. Poelz of Radbruch, Germany, and *Cyrtodactylus kotschyi fitzingeri* from Cyprus, for which thanks are due to Mr. A. Zahavi of this Department.

Most of the slides were prepared by the acetic-orcein and "Feulgen" (without SO_2 differentiation) squash techniques. Following Wahrman and Zahavi[3], "pretreatment" with hypotonic solutions was employed with much benefit. With this treatment not only were the spermatogonial and first spermatocyte divisions well spread, but the second spermatocyte chromosomes were found most useful for morphological analysis, owing to the repulsion between chromatids.

Results of chromosome counts are listed in Table I, and classified according to the cells they are based on. $2n$ = mitotic metaphase; n(M I) = first meiotic metaphase and/or diakinesis; n(M II) = second meiotic metaphase.

All the chromosomes of *Ptyodactylus* and *Tropiocolotes* are rod-shaped. The complement of

TABLE I

Species	Origin	$2n$	n (M I)	n (M II)
Ptyodactylus hasselquistii	Israel	40	20	20
Hemidactylus turcicus	Israel	44	22	—
Tropiocolotes steudneri	Israel	38	19	19
Stenodactylus Stenodactylus	Israel	38	19	19
Ceramodactylus doriae	Israel	—	19	—
Alsophylax tuberculatus	Israel	—	21	—
Cyrtodactylus kotschyi orientalis	Israel	—	21	—
Cyrtodactylus kotschyi fitzingeri	Cyprus	—	21	—
Oedura lesueurii	Australia	36	18	18

Stenodactylus stenodactylus contains at least 5 pairs of J-shaped chromosomes of various sizes, while most of the other elements are rod-shaped. In *Oedura* there are more than 6 J-shaped pairs, and two of the smallest pairs ('microchromosomes') are V-shaped, the remainder again being rod-shaped. In all the species studied the smallest chromosomes are regularly arranged in the centre of the equatorial plates, but cannot be defined as a distinct group of 'microchromosomes', since there exists a gradient of sizes.

I wish to thank Dr. E. Goldschmidt for her guidance and kind interest. I am also very grateful to Dr. J. Wahrman and Mr. A. Zahavi for their help.

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Volume 5B, 1955—1956

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Bull. Res. Counc. of Israel. B. Biol. & Geol.

INDEX

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INDEX TO VOLUME 5B

CONTENTS

Number 3–4, March–June 1956

PROCEEDINGS

AUTHOR INDEX

SUBJECT INDEX

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